Knowledge Management Orientation, Organisational Capabilities and Performance: An Empirical Test of Performance Relationships Using Structural Equation Modeling

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ABSTRACT

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Knowledge Management Orientation, Market Orientation, Learning Orientation, Organisational Innovativeness, Organisational Capabilities, Business Performance, Structural Equation Modeling

It is widely recognised that knowledge is a strategic resource, and that knowledge management capability is central to create and maintain competitive advantage in the dynamic business arena. Companies must leverage their existing knowledge and create new knowledge in order to succeed the competition. In practice, some companies make enormous investment in developing and adopting knowledge management tools and techniques. Unfortunately, many of them fail to achieve the desired outcomes. This has confounded knowledge management efforts and has blurred their extolled benefits. Unless its role in business performance improvement is justified, knowledge management remains an ad hoc event in the practices of many companies.

Academically, the majority of research focuses on defining knowledge, intellectual capital, and knowledge management, and identifying knowledge management processes. Some recent research has aimed at finding the factors that influence knowledge management success. However, their results are based on case studies of one or a few companies. Additionally, very little research has been incisive in understanding knowledge management performance. The resource-based view, and its extension, the knowledge-based view, suggest that performance differences between companies are a result of their different knowledge bases and differing capabilities in developing and deploying knowledge. Knowledge management is the pre-eminent capability of businesses, and the principal driver of all other capabilities. Simply

speaking, knowledge management impacts on performance through enhancement of other aspects of organisational capabilities, such as market orientation, organisational learning and innovation. The task of this research is to provide empirical evidence and test these theoretical propositions.

More explicitly, the main objective of this research is to identify the relationships between knowledge management orientation, market orientation, learning orientation and organisational innovativeness, and thereby the direct or indirect impact of knowledge management on performance outcomes. Due to the strong causal nature of this research, the quantitative research methodology, in particular, structural equation modeling was employed. Research hypotheses and models were developed from theoretical insights and extant empirical research findings. Data were collected using questionnaire survey from medium to large companies based in the Great Britain, and subsequently analysed using SPSS 10 and AMOS 4. The main findings of this research supported the theoretical proposition that knowledge management is imperative in building organisational capabilities of market orientation, learning and innovation. Although it does not have direct impact on performance, knowledge management indirectly impacts on performance through building and strengthening other aspects of organisational capabilities. It is through market-oriented behaviour and new product development that companies transfer their knowledge management capability into delivery of better value to the customers and thus achieve marketplace-based competitive advantage. The statistical analysis strongly supported the convergent, discriminant, and predictive validity of the research constructs and findings.

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Introduction

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1.1 BACKGROUND OF RESEARCH

Business challenges today are becoming more numerous, more threatening, and more urgent. These challenges come in many guises: global competition, industry upheavals, e-technology and many more. It is imperative that firms respond to these with agility and acuity. In this new world of knowledge-based economies, organisations increasingly have to deal with such matters as:

- The greater demands being placed on businesses by customers;
- The shift in the relative importance of factors of production away from capital towards knowledge;
- Increasing complexity of products and processes;
- Growing reservoir of relevant knowledge, both technical and non-technical;
- Increasing global competition coupled with shorter product life cycles, implying learning processes have to be quicker;
- An increased focus on the core competencies of the firm, which have to be coordinated. This means concentrating on the few value-adding tasks but letting go less relevant ones;
- Increasingly flexible workforce, resulting in a mobile workforce, which makes holding on to knowledge and transferring knowledge all the more difficult (Uit Beijerse, 1999; Harvey and Denton, 1999; Pemberton and Stonehouse, 2000).

To succeed in the highly competitive business arena, companies must leverage their existing knowledge and create new knowledge that favourably positions them in their targeted market (Gold et al. 2001). Leading management theories have popularised knowledge as a valuable strategic asset (Brown and Duguid, 1991; Davenport, et al., 1996; Kogut and Zander, 1992). Indeed, the value of most products and services depends primarily on how knowledge-based intangibles, such as technological know-how, product design, marketing, customer orientation, etc. are developed (Quinn, 1992). The role of knowledge management in generating organisational competitive advantage has received intensive attention and knowledge is increasingly regarded as the critical resource of firms and economies (Drucker, 1993; Quinn, 1992; Reich, 1992). The world is becoming a 'knowledge society' (Drucker, 1968; Bell, 1973;

Toffler, 1990) and knowledge management is central in creating and maintaining competitive advantage in the dynamic business world.

Knowledge management, nevertheless, remains a young conscious business practice (Hansen, et al 1999). It has primarily focussed on developing new applications of information technology to support the digital capturing, storage, retrieval and distribution of an organisation's explicitly documented knowledge (Davenport et al. 1996; Goodman and Darr, 1996). With the recognition of the important role of tacit knowledge, organisations diverted attention to social capital that develops from people interaction (Nahapiet and Ghoshal, 1998), and which in turn requires alignment of organisational structure, culture, and reward systems (Quinn, et al 1996). In spite of the progress in understanding the multi-facets of knowledge management, how to achieve knowledge management success and improve business performance remains unsolved. The task of this research is to identify and develop a knowledge management construct and examine the impact of knowledge management in building organisational capabilities and consequently improving business performance.

1.2 RESEARCH OBJECTIVES

Research in the field of knowledge management has been preoccupied with discussions of what is knowledge management and identification of knowledge management processes. The majority of empirical research conducted thus far has been primarily case-based and aimed at identifying factors that underpin successful knowledge management. In practice, companies typically make huge investment in knowledge management tools and techniques. This makes it particularly important to achieve better performance in order to justify the investment. However, there is not an effective measurement of knowledge management in the existing literature.

Another gap in knowledge management research is the lack of in-depth understanding of the impact of knowledge management on performance. At the theoretical level, it is argued that performance differences between companies are a result of their different knowledge bases and differing capabilities in developing and deploying knowledge (Bierly and Chakrabarti, 1996). It is also suggested that knowledge management impacts on performance through organisational learning (Cohen and Levinthal, 1990, innovation (Carneiro, 2000; Nonaka and Takeuchi, 1995), and market orientation (Kohli and Jaworski, 1990; Narver and Slater, 1990). This latter argument suggests that knowledge management enhances other aspects of organisational capabilities, which in turn improve performance. The focus of this research is to examine the direct and indirect effects of knowledge management on performance. The main objectives of this research can be broken down into the following: -

- As the majority of research defines knowledge management from a process-based view, little insights are available to understand knowledge management as organisational capability. Therefore, this research firstly aims to clarify the concept of knowledge management from the capability-based view and redefines knowledge management in terms of knowledge management orientation.

- The identification of a strong measurement construct of knowledge management is a prerequisite to further empirical research. This remains a knowledge gap. Thus one of the key purposes of this research is to identify the components of knowledge management orientation and establish a knowledge management orientation construct.

- Although innovation research has been long standing, there is not a holistic construct of organisational innovative orientation. One of the aims of this research is to identify the components of innovative orientation and construct an effective measurement of innovative orientation.

- The primary objective of this research is to examine whether knowledge management orientation has direct or mediated impact on organisational performance.

- An alternative task is to examine whether knowledge management orientation leads to strengthening of organisational capabilities, such as learning orientation, market orientation and innovative orientation.

- It is also of interest to investigate whether learning orientation, market orientation or innovative orientation lead to better performance.

In summary, the objectives of this research are to establish measurement constructs for knowledge management orientation and innovative orientation respectively, and to further study the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance.

1.3 JUSTIFICATION FOR RESEARCH

The rationale of knowledge management is to enhance an organisation's capabilities to cope with fast changing and increasingly intensive competition. In practice, knowledge management has yielded mixed results. Those who failed in achieving return on investment lost faith in knowledge management. Some even claim that knowledge management is another fad. Unless its impact on performance and its role in building up organisational capabilities is established, knowledge management remains a doubt in many organisations. This research lays out the framework to understand the role of knowledge management in creating performance outcomes.

Table 1.1 Knowledge Management Assumptions

Assumption	Support of Assumption	Negation of Assumption
Knowledge is worth managing	Recognition of the knowledge economy; knowledge management initiatives in numerous organizations	Much effort is spent managing explicit knowledge when most knowledge is tacit
Organisations benefit from managing knowledge	Effective data mining (e.g. Wal-Mart)	Business process re-engineering severely downsizes a company which initiates long-term success
Knowledge can be managed	Appointment of a chief knowledge officer	Difficult to transfer best practices
There is no risk in managing knowledge	Organizational structures for knowledge management	Tacit knowledge may contain incorrect assumptions

Source: Stewart, et al. (2000), p45.

Research in knowledge management bears a few assumptions. (1) Knowledge is worth managing; (2) Organisations benefit from managing knowledge; (3) Knowledge can be managed; and (4) Little risk is associated with managing knowledge (Stewart et al., 2000). Support and negation of these assumptions is illustrated in Table 1.1.

1.4 RESEARCH PROCESS

Details of the research design and methodology employed in this research are discussed in Chapter 5. This section is to briefly illustrate the research process through which a better understanding of knowledge management orientation and its impact on performance and other organisational capabilities will be achieved.

This research follows a logical development of quantitative research and involves five main stages: -

- Literature review. Chapter 2 and 3 present the literature review. Chapter 2 reviews concepts of knowledge and knowledge management and identifies components of the knowledge management construct. Chapter 3 reviews literature on conceptualisation and operationalisation of market orientation, learning orientation, innovative orientation and performance.

- Research hypotheses development and model generation. Chapter 4 is based on theories and existing empirical research findings. The relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance are elaborated. Research hypotheses are developed logically and the research model is generated.

- Research design and methodology. Chapter 5 presents detailed discussions of research design and methodology chosen for this research. Sampling procedure, data collection, design of survey instrument and questionnaire administration are reported. Validity and reliability of research design is discussed at the theoretical level.

- Data analysis. Chapter 6 and 7 report data analysis. Chapter 6 discusses data analysis of the measurement models. Convergent validity of measurement models is tested using confirmatory factor analysis. Reliability of each construct is tested using Cronbach's Alpha. The discriminant validity is tested using Pearson correlation. Chapter 7 reports data analysis of the structural model using structural equation modelling.

- Discussions, findings, conclusions, and recommendations. Chapter 8 reports detailed discussions based on findings from data analysis. Chapter 9 provides an overview of this research's objectives and outcomes. Conclusions, limitations of this research, and recommendations for future research are made.

1.5 CONCLUSIONS

This chapter has outlined in brief the research background, research objectives, justification for research and the research process proposed to achieve the research objectives. In summary, the main objectives of this research are to identify an effective knowledge management orientation construct and further explore the impact of knowledge management orientation on performance, as well the role of knowledge management in building organisational capabilities such as market orientation, learning orientation, and innovative orientation which are essential for organisational success. The research follows a logical quantitative research design and employs a survey questionnaire to collect data. Data analysis is conducted in structural equation modelling. The following chapters report in details the above stages, as indicated in the research process section of this chapter.

Chapter Two

Knowledge Management Orientation

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2.1 INTRODUCTION

Only since 1990s has knowledge management started to emerge as a special area of interest in academia, but the explosion of literature reveals a rapidly increasing interest from a wide range of disciplines, including psychology, management science, sociology, strategy and production engineering etc. (Nonaka and Takeuchi, 1995). This accelerating popularity of knowledge management in academic research is echoed by the challenges that businesses have to face: knowledge management and learning is a way for businesses to cope with the heightened complexity of the new world arena, and critical for businesses to achieve competitive advantage in the marketplace. Organisational success is determined by the interplay of many factors. Some are beyond influence or control while others are under the aegis of internal control. Most of these challenges have forced companies to examine how they can leverage their knowledge capability base more effectively. Unfortunately, many of these responses have frequently failed to achieve the desired results. Many millions of pounds are spent annually on knowledge programmes. In light of large-scale investments, companies anticipate large-scale improvements and benefits on the bottom line. The evidence that is transpiring is rather mixed, especially in terms of bottom line impact. Some companies have been very successful, while for many the experience has been rather more muted. This has fuelled a growing disquiet amongst some, who have increasingly begun to voice questions regarding knowledge management and its alluded benefits.

This in turn calls for an effective measurement of knowledge management in pragmatic senses as well as in academic research. However, there is an absence of effective measurement constructs that underpin knowledge management performance. This has been a great hindrance to empirical research. Identifying the essential components of knowledge management and establishing an effective knowledge management measurement construct is a key focus of this research. This chapter reviews literature on knowledge management and identifies five main elements of effective knowledge management, namely the knowledge system, organisational memory, knowledge sharing, a learning culture, and knowledge benchmarking. These five elements are incorporated into the Knowledge

Management Orientation construct. Key variables of each of the five components are identified accordingly.

2.2 THE CONCEPT OF KNOWLEDGE

Knowledge is conceptualised in various ways. For example, some authors view knowledge as a resource which has independent existence outside human and social systems (i.e. McAdam and McCreedy, 1999), or as intellectual capita which can be segregated into human, customer, process and growth elements contained in the two main categorises of human capital and organisational capital (i.e. Skandia, 1994). Other authors view knowledge as a human process of justifying personal beliefs as part of an aspiration for the 'truth' (i.e. Nonaka, 1994). The significant distinctions in understanding of knowledge has led to a diversified emphasis within knowledge management. Effective knowledge management requires attention to various dimensions of managing knowledge (Nonaka and Takeuchi, 1995; Davenport et al 1998; Bierly et al 2000). The following are the four primary dimensions: rationalism vs. empiricism, tacit vs. explicit knowledge, information vs. knowledge, and individual vs. collective knowledge.

2.2.1 Rationalism vs. Empiricism

The concept of knowledge can be dated back to thousands of years ago and related to the development of ancient philosophies. Western philosophers defined knowledge as "justified true belief" (Plato, quoted in Russell, 1961), in spite of disputes about sources of knowledge. It was argued that either a priori true knowledge exists, and knowledge comes from only ideal mental process (by rationalism) or there is no a priori true knowledge, and knowledge comes from sensory experience (by empiricism). Successive philosophers trying to synthesise both theories concluded that knowledge arises only when both the logical thinking and sensory experience work together (Kant, 1965). Perception is an interaction between the 'knower' and the 'known'. Knowledge is obtained by handling things or 'action' and its truth should be demonstrated in practice (Karl Marx, quoted in Russell, 1961, p749-750). In specific terms, western society believes that knowledge is theories and principles deducted from practices, and abstracts from objective points into precise, systematic theories or sciences. Knowledge has many guises. It can be in the form of explicit knowledge, such as scientific principles (Taylor, 1911a, b), formal practices and procedures (Mayo, 1933), and logical and linguistic content (Barnard, 1938); or tacit knowledge, such as informal structures, rules, norms (Mayo, 1933), and behavioural patterns (Barnard, 1938) (see Table 2.1).

The Japanese concept of knowledge is based on the three "oneness" philosophies - "oneness of humanity and nature"; "oneness of body and mind"; and "oneness of self and other" (Nonaka and Takeuchi, 1995, p27). This view emphasises the interaction between human, environment, and action. The Japanese recognise that knowledge is a personal "belief" and stress the importance of "justification" of knowledge, i.e. knowledge is a dynamic human process of justifying personal beliefs in search of the "truth" (Nonaka, 1994, p14). The Japanese approach to knowledge is more about personal experience, interpersonal interactions, and is more subjective and tacit. "True knowledge cannot be obtained simply by means of theoretical thinking, but only through bodily recognition or realisation." Therefore, knowledge is based "on-the-spot-ism" or "experiencism". (Nonaka, 1987, p25-26). A reflection of the "oneness of self and other" philosophy is the emphasis of collective learning and knowledge acquisition. The Japanese share a similar viewpoint with western empiricist theory on the concept of knowledge (see Table 2.1).

Table 2.1. A Generic Comparison Of The Concept Of Knowledge

	Rationalism	**Empiricism**
Definition of knowledge	Justified true belief	Justified personal belief
Knowledge focus	Technology, explicit knowledge, scientific principles	People, tacit knowledge, personal experience and interaction
Nature	Universal, absolute, logical, static, and nonhuman	Personal, relative, interactive, dynamic, and human
Process	Deduction	Interaction

Nonaka (1994, p15) comments upon the western concept of knowledge and notes that, unlike the Japanese concept, the west emphasises "the absolute, static and nonhuman nature of knowledge, typically expressed in prepositional forms in formal logic." Until today, in the western society, there is still a widespread understanding of knowledge as a resource independent of human and social systems (See McAdam & McCreedy, 1999), stored in the two main categories of human capital and organisational capital (Chase, 1997).

2.2.2 Explicit vs. Tacit Knowledge

The categorisation of knowledge components varies from one author to another. The prime classification is tacit (or implicit, or uncodified) and explicit (or articulated or codified) elements of knowledge. Explicit knowledge is specified as being in writing, drawings, computer programs, etc. (Hedlund, 1994), and can be transmitted across individuals and organisations formally and easily (Nonaka and Takeuchi, 1995). Tacit knowledge is nonverbalised, intuitive and unarticulated (Polanyi, 1962). It is not readily transmitted between individuals or organisations, because tacit knowledge has a personal nature and is imbedded in individual experience" or other intangible factors such as "personal belief, perspective and the value system." (Nonaka and Takeuchi, 1995). It is commonly recognised that, in the organisational context, knowledge is a shared collection of tacit and explicit knowledge and is information combined with experience, context, interpretation, and reflection (Davenport, et al., 1998).

Boisot (1987) considers knowledge as codified and uncodified, and as diffused and undiffused, within an organisation. Codified knowledge can be readily prepared for transmission purposes. Diffused knowledge refers to what is readily shared while undiffused refers to what is not readily shared. Drawing on these two dimensions, four categories of knowledge are created: proprietary knowledge (codified, but undiffused); public knowledge (codified and diffused); personal knowledge (uncodified and undiffused); and common sense (diffused, but uncodified).

Although it is argued to be unidimensional and restricted (McAdam and McCreedy, 1999), the classification of tacit and explicit knowledge has been adopted by majority of researchers. Both tacit and explicit knowledge is sub-classified to facilitate in-depth study (Zack, 1999). For example, Parikh (2001) identifies the following sources of tacit and explicit knowledge in organisational contexts (see Table 2.2). How to manage tacit and explicit knowledge and their interaction has developed into a prime synergy of knowledge management research (Nonaka and Takeuchi, 1995; Zack, 1999; Lam, 2000; Platts and Yeung, 2000).

Table 2.2 Sources Of Knowledge In Organisational Contexts

	Internal	External
Tacit	Firm experiences Insights/ intuitions Educational background Cultural backgrounds Intraorganisational relationships Unwritten rules of thumb History and stories Master technicians Experts/ researchers	Industry experts/ consultants Industry best practices Interorgnisational relationships Consumers Academic researchers Other research institutes
Explicit	Organisational databases Information systems File systems Standard operating procedures Discussion minutes / trails Designs and prototypes Product manuals Own patents	Trade publications External databases Benchmarking matrices Others' patents Competitors' products and manuals Academic research articles Specifications and design manuals Standards Regulatory guidelines

Source: Parikh (2001, p29)

2.2.3 The knowledge-hierarchy

Knowledge is distinguished from data and information (MacKay, 1969; Churchman, 1971; Bruner, 1973; Bobrow and Collins, 1975; Dretske, 1981; Zack, 1999). Data are raw facts (Bierly, et al. 2000) and raw materials of higher order constructs (Davis and Olson, 1985). They are out of contexts and thus not directly meaningful (Zack, 1999). In contrast, information is meaningful data in relation to certain contexts (Zack, 1999). Information is composed of data processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective actions and decisions (Davis and Olson, 1985) (see Table 2.3).

Table 2.3. Four Levels Of The Knowledge-Hierarchy

Level	Definition	Learning Process	Outcome
Data	Raw facts	Accumulating truths	Memorization (data bank)
Information	Meaningful, useful data	Giving form and functionality	Comprehension (information bank)
Knowledge	Clear understanding of information	Analysis and synthesis	Understanding (knowledge bank)
Wisdom	Using knowledge to establish and achieve goals	Discerning judgments and taking appropriate action	Better living / success (wisdom bank)

Source: Bierly et al (2000), p598.

From this perspective, knowledge is clear understanding of information and its associated patterns, meaningfully organized accumulation of information through experience, communication or inference (Zack, 1999). Six characteristics of knowledge distinguish it from information: knowledge is a human act; knowledge is the residue of thinking; knowledge is created in the present moment; knowledge belongs to communities; knowledge circulates through communities in many ways; new knowledge is created at the boundaries of old; leveraging knowledge involves a unique combination of human and information systems (McDermott, 1999). Bierly et al. (2000) further develop the concept of wisdom, a higher level on the knowledge hierarchy. Wisdom is "the ability to best use knowledge for establishing and achieving desired goals" and learning about wisdom is "the process of discerning judgements and action based on knowledge" (p601). Simply put, wisdom is the ability to effectively choose and apply the appropriate knowledge in a given situation. In organisational contexts, wisdom is using knowledge to establish and achieve goals (see Table 2.3), focusing on the implementation and action stage of knowledge management.

2.2.4 Individual vs. Collective Knowledge

Knowledge within an organisation can reside at the individual level and be shared among organisational members. Individual knowledge resides in people's brains and bodily skills of each individual and can be applied independently to specific types of tasks. Individuals have autonomy to use it. Collective knowledge refers to the ways in which knowledge is distributed and shared among members of the organisation. It is the accumulated knowledge stored in the form of rules, procedures, routines and shared norms (Lam, 2000). Collective knowledge exists between rather than within individuals. However collective knowledge is not necessarily the sum of the individuals' knowledge, but depends on the mechanism that promotes knowledge sharing between individuals and transfers into collective knowledge (Glynn, 1996).

Combining the individual vs. collective dimension and the tacit vs. explicit dimension, Lam (2000) borrows from Collins (1993) and Blackler (1995) and categories four types of knowledge: embrained knowledge, encoded knowledge, embodied knowledge and embedded knowledge.

- Embrained knowledge (individual-explicit): formal, abstract or theoretical knowledge. It is dependent on the individual's conceptual skills and cognitive abilities. Scientific knowledge belongs to this category.

- Embodied knowledge (individual-tacit): action-oriented knowledge. It is built on bodily or practical experience and has a strong automatic and voluntaristic component.

- Encoded knowledge (collective-explicit): codified knowledge. It is stored in blueprints, recipes, written rules and procedures, and tends to generate a unified and predictable pattern of behaviour and output in organisations.

- Embedded knowledge (collective-tacit): residing in organisational routines and shared norms. It is rooted in an organization's communities-of-practice.

Hedlund and Nonaka (1993) expand the dimension of individual and collective into 'individual, group, organisation, interorganisational domain' and, combining the dimension of explicit vs. tacit, formulate eight types of knowledge (see Table 2.4).

Table 2.4 Knowledge Categorisation

	Individual	Group	Organisation	Inter-organisation
Explicit knowledge	Knowing calculus	Quality circle's documented analysis of its performance	Organisation chart	Supplier's patents and documented practices
Tacit knowledge	Cross-cultural negotiation skills	Team coordination in complex work	Corporate culture	Customer's attitudes to products and expectations

Source: adapted from Hedlund and Nonaka (1993)

The nature of knowledge is dynamic. Firstly, knowledge consists of both tacit and explicit components, and is embedded in both intangibles such as personal belief and value system, and tangibles such as documents, drawings and records. The interaction between tacit and explicit knowledge is a major interest in knowledge management and is considered as the main mechanism of knowledge production. Secondly, people are actively involved in knowledge management processes. Unlike simple information, which is just a flow of signs, knowledge is instructive and subjective (Nonaka and Takeuchi, 1995). It is a person's interpretation of information and has specific meaning in relation to a certain object. Therefore, knowledge is inseparable from people who create, store and refine it. Thirdly, the interaction of people, information, and environment is crucial to knowledge production. Knowledge is specific to a certain object, at a certain time, and within a certain context. Knowledge applicable to one situation does not necessarily suit another. Knowledge evolves over time and across space.

2.3 DEFINING KNOWLEDGE MANAGEMENT ORIENTATION

Previous studies more or less focused on a certain perspective of the domain and based their research design on certain dimensions of knowledge management. For example, the majority of studies focus on the processes of knowledge management. While some other researchers focus on the technological perspective and regard knowledge management as managing technology, in particular information technology (Dewett and Jones, 2001; Tecuci and Duff, 1994; Corbridge et al 1994; Bhandari, 1994). Over time, researchers have realised that the multiple perspectives of knowledge management must be considered in designing and implementing knowledge management programs. Managing knowledge is not simply managing technology or intellectual assets. Successful knowledge management depends on success in information technology, but also involves a successful match with other organisational parameters such as organisational structure, processes, and a learning environment (Srinivasan, 1998), etc. The correct interaction between technology, people and process can create synergies in knowledge management.

2.3.1 Elements of Managing Knowledge

People are the key element of knowledge management. They are the carriers, users and creators of knowledge. Technology is an enabler and allows for solutions to scale. Processes indicate direction and provide templates for successful practices (Vollmer and Phillips, 2000).

- The functions of information technology as an enabler of knowledge management are broadly categorised as creating knowledge repository, and creating networks (Hansen et al 1999; Pemberton and Stonehouse, 2000; Roberts, 2000; Bloodgood and Salisbury, 2001). Information technology facilitates capturing, codifying, storing and retrieving knowledge and thus creating and maintaining a knowledge repository that acts as an organisational memory function. On the other hand, modern information technology has also greatly facilitated creating dialogues and communications between people and thus creating networks of knowledge.

- People are the most important and most challenging component of managing knowledge. People are the decision-makers to identify, acquire, utilise, share and create knowledge, particularly tacit knowledge. Successful knowledge management depends heavily on engaging all individuals at different levels of the organisation, and incorporating individual knowledge into organisational knowledge. Empowerment and a learning culture are essential to successes of knowledge management (De Long and Fahey, 2000; Bartlett, 1998; Davenport et al 1998).

- Processes are structured, measured sets of activities designed to convert inputs into specified outputs. A knowledge management process map may contain activities, business units, inputs, outputs, cycle time and decision points. Thus, it reveals where knowledge is stored and used, who needs it and uses it, how it can be dispersed, and where knowledge creation occurs, etc. Authors have made differing emphasis on processes of knowledge management. For example, Nelson and Winter (1982) and Garud and Nayyar (1994) emphasise the process of knowledge storage in the routine functioning. For example, Nonaka (1994) emphasizes knowledge creation via four processes: socialization, externalization, combination and internalization. While knowledge sharing is a focus of studies by many authors such as O'Dell et al (1999), etc.

Theoretical insights into how to manage knowledge are available from several disciplines, including economics (Silberston, 1967), philosophy and epistemology (Kuhn, 1970), computer science (Hayes-Roth, et al. 1983), and sociology (Polanyi, 1958, 1966). Indeed, each discipline emphasises different aspects of the above three elements of knowledge management. Earl (2001) categorises seven schools of knowledge management (i.e. systems, cartographic, engineering, commercial, organisational, spatial, and strategic) into three disciplines, namely the technocratic, economic, and behavioural discipline (see Table 2.5).

Table 2.5 Schools Of Knowledge Management

School	Technocratic			Economic		Behavioural	
	Systems	Cartographic	Engineering	Commercial	Organisational	Spatial	Strategic
Focus	Technology	Maps	Processes	Income	Networks	Space	Mindset
Aim	Knowledge bases	Knowledge directories	Knowledge flows	Knowledge assets	Knowledge pooling	Knowledge exchange	Knowledge capabilities
Unit	Domain	Enterprise	Activity	Know-how	Communities	Place	Business
Example	Xerox Shorko Films	Bain & Co AT &T	HP Frito-Lay	Dow Chemical IBM	BP Amoco Shell	Skandia British Airways	Skandia Unilever
Critical success factors	Content validation Incentives to provide content	Culture/ Incentives to share Networks to connect people	Knowledge learning and information unrestricted distribution	Specialist teams Institutionalised process	Sociable culture Knowledge intermediaries	Design for purpose Encouragement	Rhetoric artefacts
Principle IT contribution	Knowledge-based systems	Profiles and directories on Internets	Shared databases	Intellectual asset register and processing system	Groupware and Intranets	Access and representational tools	Eclectic
Philosophy	Codification	Connectivity	Capability	Commercialisation	Collaboration	Contactivity	Consciousness

Source: Earl (2001), p217

2.3.2 Knowledge Management Approaches

The way organisations emphasise different knowledge management elements, i.e. people, technology and processes, and undertake the process varies, and forms the approaches to knowledge management. Previous studies have created different classifications of knowledge management approaches. For example: -

- Terrett (1998), in search for a methodology that allows the systematic capture, development and use of knowledge, together with development of an internal knowledge market, summarises three models of knowledge management. The first model envisages a learning loop: combining existing knowledge base with employees' own knowledge to deliver performance, which in turn feeds back to the knowledge base. The second model is adopted from Skandia's Intellectual Capital model and categorises knowledge into different types of capital. The third model follows Nonaka and Takeuchi's (1995) interactive knowledge management model, consisting of four modes of knowledge management: socialization, externalisation, combination and internalisation.

- Zack (1999) segments knowledge processes into two broad classes: integrative and interactive. The former exhibits a sequential flow of explicit knowledge into and out of a knowledge repository, while the latter focuses primarily on supporting interaction among those people with tacit knowledge.

- Hansen, et al (1999) categorise two prime types of knowledge strategy: the codification strategy and the personalisation strategy, and accordingly explain two approaches to implement them. The "people-to-document" approach for the codification strategy focuses on knowledge codification –knowledge is extracted from the person who developed it, made independent of that person, and reused for various purposes. While the "people-to-people" approach for the personalization strategy focuses on dialogue between individuals, not knowledge objects in a database. Knowledge that has not been or could not be codified is transferred in brainstorming sessions and one-on-one conversations.

- Blumentritt and Johnston (1999) summarise three distinctive approaches. The first focuses on intellectual capital and its measurement and management, and refers to Skandia's model. The second approach addresses directly the management of knowledge itself – how to optimise the knowledge creation, capture and flow into, and within a company, and stresses the everyday management on facilitating and managing knowledge-related activities, such as creation, capture, transformation and use of knowledge. The third approach addresses the knowledge economy, concerning deciphering the rules and best-practice models that determine effectiveness, even survival in the knowledge economy and to provide a reliable basis for national assessment, policy and regulation.

From the above literature, Zack (1999) and Hansen et al (1999) offer very similar insights into the knowledge management approaches. Zack's integrative approach is parallel to Hansen et al's people-to-documents approach, and Zack's interactive approach to Hansen et al's people-to-people approach. Combining the theoretical categorisation and reality of practices, Zack's (1999) classification is adopted here to illustrate the differences between two main approaches of knowledge management along a spectrum. As shown in Figure 2.1, the spectrum has two polar directions, each representing a typified integrative or interactive approach respectively. However, these two approaches are not absolutely exclusive to each other. In fact, in most companies, two approaches co-exist, but are given different weight in practice.

Integrative Approach	Interactive Approach
People-to-document approach	People-to-people approach
Scientific focus	Humanistic focus
Deduction and codification	Interaction and personalization
Managing technology	Managing processes
IT emphasis on coding and storing	IT emphasis on creating dialogues and networks
Managing knowledge is to maintain knowledge-base	Managing knowledge is to facilitate knowledge flow

Figure 2.1 The Spectrum Of Knowledge Management Approaches

The integrative approach "exhibits a sequential flow of explicit knowledge into and out of a repository. Producers and consumers interact with the repository rather than with each other directly. The repository becomes the primary medium for knowledge exchange, providing a place for members of a knowledge community to contribute their knowledge and views. The primary focus tends to be on the repository and the explicit knowledge it contains, rather than on the contributors, users, or the tacit knowledge they may hold." (Zack, 1999, p50)

The interactive approach "focuses primarily on supporting interaction among those people with tacit knowledge. In contrast to integrative applications, the repository is a by-product of interaction and collaboration rather than the primary focus of the application. Its content is dynamic and emergent." (Zack, 1999, p51). The approach stresses the importance of personal, experiential, relative, and social knowledge. Managing knowledge is to a great extent managing people and focuses on the tacitness of knowledge components. Knowledge constitutes human interest rather than being restricted to a functionalist science approach. It is achieved in a cultural, socio-historical context usually made available through the everyday experience of individuals (Burgoyne, et al., 1994; Lave and Wenger, 1991). "Philosophy of science has largely been replaced on the intellectual agenda by the history and sociology of knowledge which emphasises cultural and historical processes rather than rationally superior knowledge" (Burgoyne, et al., 1994). "The purpose of knowledge management is to enhance organisational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of all three types of knowledge (i.e. human knowledge, social knowledge and structural knowledge) that are critical for decision making." (De Long and Fahey, 2000, p115).

2.3.3 Defining Knowledge Management

Definitions of knowledge management proliferate in the literature. The majority of authors define knowledge management as process-based. For example: -

"Knowledge management is ... knowledge creation, which is followed by knowledge interpretation, knowledge dissemination and use, and knowledge retention and refinement." (De Jarnett, 1996).

Knowledge management is the process of generating new knowledge, accessing knowledge from external sources; representing knowledge in documents, databases, software, etc.; embedding knowledge in processes, products, and services; transferring existing knowledge around an organisation; using accessible knowledge in decision making; facilitating knowledge growth through culture and incentives; measuring the value of knowledge assets and the impact of knowledge management, etc. (Galagan, 1997).

"Knowledge management is the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities." (Quintas et al., 1997)

"Knowledge management is the activity which is concerned with strategy and tactics to manage human centred assets." (Brooking, 1997)

Knowledge management is primarily centred on the formalisation, storage, sharing and distribution and co-ordination of existing knowledge assets throughout the organisation, building and exploiting core competences that yield superior performance (Pemberton and Stonehouse, 2000)

Managing knowledge in a changing environment is not simply managing technology and digitally capturing and storing knowledge. To complete understanding of the concept of knowledge, structural, cultural, strategic, psychological, cognitive, as well as technological factors need to be considered. Knowledge management is commonly seen as a set of processes that involve interactions between people and technology. From this holistic point of view, knowledge management is defined here as:

> *Knowledge management is about managing both explicit and tacit knowledge and using information technology to facilitate the processes of knowledge capturing, codification, storage, retrieval, sharing, dissemination and creation etc., to achieve a defined organisational goal.*

This definition intends to proffer a holistic conceptualisation of knowledge management, involving people, technology and processes. Additionally, this definition links knowledge management to overall organisational management. In business terms, organisational knowledge is reflected in the quality of organisational outcomes. Organisations need to benefit from knowledge management (Degler and Battle, 2000), i.e. to improve organisational performance, and achieve organisational success (Kogut and Zander, 1992; Nonaka and Takeuchi, 1995).

2.3.4. The Concept of Knowledge Management Orientation

As companies entered the 1990s, knowledge became one of the most important strategic resources. Knowledge production is critical to sustaining competitive advantage and organisational success (Kogut and Zander, 1992; Nonaka and Takeuchi, 1995). Traditional types of competitive strategies based on industry positioning, such as cost leadership and differentiation in terms of products and markets (Porter, 1980) are not sufficient to cope with dynamic environments. The essence of strategy does not lie in an organisation's particular products and markets, but the dynamics of its behaviour (Stalk et al. 1992) and processes (Day, 1994b). Competing on capabilities, i.e. to obtain and sustain competitive advantage through the development of a distinctive set of organisational capabilities, has become a focus in the strategic field. Knowledge management exploits this resource-based perspective for organisations to compete in the dynamic marketplace. Indeed, the knowledge-based view of the organisation is considered as an extension of the resource-based view (RBV), in that knowledge is deemed as the only meaningful resource (Drucker, 1992) and constitutes the value of most products and services (Quinn, 1992). An organisation achieves its competitive advantage via its valuable, rare, inimitable, nonsubstitutable resources, and most importantly, the distinctive capabilities of utilising its resources (Penrose, 1959). Under this viewpoint, knowledge management is considered as an organisation's distinctive capability in utilising organisational knowledge to achieve performance outcomes.

2.3.4.1 Factors Influencing Knowledge Management Success

Within the knowledge management field, there is an increasing amount of literature investigating what are the factors that lead to successes of knowledge management programs and thus organisational performance. Unfortunately, the extant research is largely based on case studies or relatively small sample descriptive surveys.

- Davenport et al. (1998), from a project-based viewpoint, identify eight specific factors that were common to the successful knowledge production, through a study of thirty-one knowledge management projects in twenty-four companies. These factors are: linking to economic performance or industry value; technical and organisational infrastructure; standard, flexible knowledge structure; knowledge-friendly culture; clear purpose and language; change in motivational practices; multiple channels for knowledge transfer; and senior management support.

- Zack (1999), adopting an organisation-based stance, identifies four primary contexts through a case study of two companies – strategic context (strategic focus on knowledge and learning); knowledge context (the competitiveness of existing knowledge and learning); organisational context (culture and structure); technology context (the impact of information technology).

- O'Dell et al (1999) employ a four-phase benchmarking methodology (plan, collect, analyse, and adapt) to study knowledge management processes between 20 companies and their 11 best-practice partners, and identify four enablers to knowledge management: strategy and leadership, technology, culture and measurement, which together create a knowledge environment.

- Gupta and Govindarajan (2000), through a case study of Nucor Steel, identify a framework for building an effective "knowledge machine". The framework consists of two approaches: maximising the creation and acquisition of knowledge; and maximising the sharing of knowledge. To maximise knowledge creation and acquisition, companies need to set stretch goals, provide incentives, empower people, encourage experimentation and cultivate within the company a market for ideas. To maximise knowledge sharing, a company needs to ban knowledge hoarding, use group-based incentives, codify tacit knowledge and match knowledge transfer mechanisms to types of knowledge.

- McDermott and O'Dell (2001) particularly emphasise the role of culture in promoting knowledge sharing. They suggest that companies should make knowledge sharing visibly important by sharing knowledge to solve practical business problems; matching the style of the organisation; and aligning award and recognition to support sharing knowledge. It is through behaviour changes that the invisible values of knowledge are made visible. A considerable factor in behaviourial changes is leadership and pressures from influential peers.

- Ahmed (1999) surveyed 122 companies and identifies several characteristics associated with high performance knowledge projects: knowledge management program is implemented as a systematic program; organisation-wide implementation; senior management support; overall awareness and involvement; communication; reward for individual; technology-driven or people driven; structure and process change; and alignment with strategy.

- Gold, et al (2001) elaborate three key infrastructures, i.e. technical, structural, and cultural, that enable maximisation of social capital. Technology comprises a crucial element of the structural dimension needed to mobilize social capital for the creation of new knowledge. Structure is important in leveraging technological architecture. While shaping culture is central in a firm's ability to manage its knowledge more effectively.

Indeed, literature encompasses many perspectives of knowledge management. However, extant literature is mostly theoretical. Even empirical findings are based on one or a few case studies or surveys of a small number of samples. This explains the ad-hoc and scattered nature of current understanding of knowledge management performance. There is an urgent need of developing and establishing an effective knowledge management performance measurement construct. The following sections provide extensive review of existing theories and empirical findings and systematically develop a knowledge management orientation construct.

2.3.4.2 Defining Knowledge Management Orientation

From the various branches of knowledge management literature, this study identifies five factors that are imperative to successful knowledge management. These are the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking. These five aspects form the key elements of the measurement model for knowledge management. To distinguish from the commonly used process-based definitions of knowledge management, this thesis adopts the terminology of "Knowledge Management Orientation" (KMO). Incorporating the three elements of managing knowledge, namely people, technology and processes, and the five essential factors identified in the above literature review, this study defines the following: -

> *Knowledge Management Orientation is an organisation's distinctive capability of managing the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking, to achieve organisational success.*

The knowledge system facilitates knowledge management tools and techniques, and enhances the capability of memory and sharing. Organisational memory serves as a repository of knowledge, while knowledge sharing maintains 'openness' and promotes knowledge flow and growth. A learning culture is the fundamental factor underlying the successful operation of the knowledge system, organisational memory and knowledge sharing. Knowledge benchmarking maintains an external focus of the organisation.

2.4 THE KNOWLEDGE MANAGEMENT ORIENTATION CONSTRUCT

A question that is often asked is "Can knowledge management lead to better performance?" and if it can, "how can we manage knowledge to improve performance?" It is not uncommon to see companies make a huge investment on knowledge systems, but rarely gain any returns on investment. Consequently, knowledge management programs or initiatives fade one after another without much impact on performance. Identifying the direct and indirect contribution of knowledge management in terms of organisational performance has been a thorny area. In practice, some companies assess knowledge management outcomes at project-based levels, i.e. to calculate the ratio of input and output of a single knowledge management program. By doing this, the effect that knowledge management impacts indirectly on performance is neglected. Some other companies claim that they adopt a long-term strategic view, holding a faith that knowledge management will contribute to organisational performance outcomes in the long-term, in which case short-term outcomes are not measured.

In academic terms, there is a scarcity of knowledge management frameworks that can be used to assess companies' knowledge management outcomes, and the linkage to organisational performance. Most recently, Darroch and McNaughton (2001) set up a knowledge management orientation scale grounded in Kohli et al's (1993) MARKOR scale. They define a knowledge management orientation analogous to a market orientation and containing three components: knowledge acquisition, knowledge dissemination and responsiveness to knowledge. Market orientation is regarded as a subset of knowledge management orientation. However, it should be recognised that, although these two concepts overlap, market orientation and knowledge management orientation have different emphasis. For example, market orientation captures behaviours of firms oriented toward the marketplace (Jaworski et al 2000) and therefore externally oriented (Day, 1994b). However, a firm could be knowledge management oriented but not emphasise the management of knowledge about the market. Alternatively, a firm could be market-oriented, but not emphasise the management of knowledge about non-market factors. Thus it is necessary to examine both concepts in terms of their impact on creating competitive advantage and organisational performance. This requires a construct of knowledge management orientation independent of market orientation. The operational definition of knowledge management orientation proposed in this research captures the five aspects that define effective knowledge management, namely the knowledge system, organisational memory, knowledge sharing, a learning culture, and knowledge benchmarking. Each of these is elaborated in the discussion that follows.

2.4.1 The Knowledge System

The knowledge system is the tools and techniques that support knowledge management practices. More specifically, it is the capability of utilising information technology to facilitate knowledge capture, codification, categorisation, retrieval, and promotion of dialogues and communications between knowledge creators, knowledge possessors and knowledge users. Within the field of IT assessment, there is an increasing emphasis on measuring the IT impact on knowledge management (McDermott, 1999; Roberts, 2000). Technology plays an important role in knowledge management processes. Knowledge management adopts a range of existing information technology into architecture for support of knowledge acquisition and diffusion. However, technology itself does not deliver knowledge management, but inspires the vision of 'a new world of leveraged knowledge' (McDermott, 1999). IT adoption has to be coupled with organisational culture in order to achieve effective knowledge management (McDermott, 1999; Roberts, 2000).

Information technology can be seen as embodying two general capabilities: codifying knowledge and creating networks via promoting dialogues and communications (Bloodgood and Salisbury, 2001). The codification and communication capabilities provided by information technology should be emphasised differently depending on the type of strategic change, and the knowledge being managed.

- Codifying knowledge refers to the function of information technology in terms of its usage as a repository of codified or explicit knowledge. Information technology facilitates more rapid transmission (e.g. by the use of email and Web pages), standardised decision-making procedures (e.g. through the use of decision support systems), or knowledge codification (e.g. through the use of expert systems, such as accounting systems). Explicit knowledge is more easily handled by IT. IT can be used to make knowledge even more explicit and disseminate the knowledge throughout the organisation quickly, by making it readily available in databases, decision support systems and expert systems. This approach leverages knowledge assets quickly and thereby enables the organisation to gain an advantage over competitors who transfer their knowledge more slowly (Hansen et al., 1999).

- Creating networks refers to the function of information technology in terms of its usage as a means to facilitate communication networks in organizations. Efforts at using IT to codify and then transfer tacit knowledge within the firm can be costly and ineffective because of the difficulties of making tacit knowledge more explicit in preparation for its transfer. Meanwhile, codifying knowledge into a more explicit form for transmission using a less rich media can result in a loss of critical components of knowledge, and increase the risk of making it more readily imitable by external entities (Nonaka and Takeuchi, 1995). IT can be used to create networks to transfer tacit knowledge. IT can also be used as a means to catalogue individuals in the organisation that hold critical tacit knowledge and then enable communications between knowledge owners and knowledge users.

On a similar ground, Hansen et al (1999) recommend that the level of IT support that a company needs depend on its choice of knowledge management strategy. They propose two distinct KM strategies: the codification strategy and the personalisation strategy, each requiring different IT infrastructures as well as different levels of support.

- For the codification strategy, heavy IT support is critical. Managers need to implement a system that is much like a traditional library – it must contain a large cache of documents and include search engines that allow people to find and use the documents they need.

- For the personalisation strategy, there is less requirement of IT investment and support. It is most important to have a system that allows people to find other people.

At a more prescriptive level, authors such as Gold et al (2001) and Roberts (2000) describe what kind of information technology facilitates different knowledge management processes. For example, Gold et al (2001) consider "technology comprises a crucial element of the structural dimension needed to mobilize social capital for the creation of new knowledge" (p187). The technological dimensions that are part of effective knowledge management include "business intelligence, collaboration, distributed learning, knowledge discovery, knowledge mapping, opportunity generation, as well as security." (p188):

- Business intelligence technology enables a firm to generate knowledge regarding its competition and broader economic environment;
- Collaboration and distributed learning technology allows individuals within the organisation to collaborate, thereby eliminating the structural and geographical impediments that may have previously prevented such interaction;
- Knowledge discovery technology allows the firm to find new knowledge that is either external or internal to the firm;
- Knowledge mapping technology allows the firm to effectively track sources of knowledge, creating a catalogue of internal organisational knowledge;
- Knowledge application technology enables a firm to use its existing knowledge;
- Opportunity generation technology allows the firm to track knowledge about its customers, partners, employees, or suppliers;
- Security technology ensures that knowledge is not stolen or used inappropriately.

Roberts (2000) studied the ability of information and communication technology to improve the transferability of information and knowledge via a wide range of IT facilities (see Table 2.6).

Table 2.6 IT Enabling Information And Knowledge Transfer

IT Services	Comments
E-mail	For day-to-day project communication, and the transfer of documents (including minutes and agendas of meetings, project reports, schedules etc...
Voice mail	Asynchronous audio communication.
Teleconferencing	Telephone discussions between more than two people.
Videoconferences	Group meetings among geographically dispersed individuals (often formal). Videoconference rooms may be dedicated to particular projects allowing for frequent use.
Desktop videoconferencing	One-to-one meeting, or small groups (often informal). May include shared computer displays and virtual project rooms.
CAD and CAM	For the transmission of specifications from design to manufacturing.
Discussion lists	Information can be shared and stored through questions and answers, encouraging the codification of knowledge normally held by select individual within the organisation.
Information database	For common access to project data.
Groupware	Includes a range of the facilities listed above, and is becoming more widespread (examples include Lotus Notes and Novell Groupwise).

Source: Adapted from Roberts (2000), p435

Roberts (2000) summarises that information and communication technology affects knowledge management in various ways:

- The proliferation of cheap decentralised computational power allows for the collection, collation, storage and dissemination of data on a scale not practicable in the past.
- ICT facilitates knowledge transfer through the exchange of data.
- ICT increases the sharing of information and information about sources of knowledge, as well as knowledge about sources of information.
- The proximity between people, which is required by transfer of tacit knowledge, is optimised through advanced information and communication technology, such as videoconferencing and virtual project rooms, although personal face-to-face contact cannot be replaced in facilitating knowledge transfer.

- ICT can enhance the transfer and creation of tacit knowledge, in that tacit knowledge can emerge from the assimilation and absorption of codified knowledge.
- ICT increases the geographic and cultural diversity available within the trust relationship, and breaks down geographical and cultural barriers. People from different places can share cultural and social norms and consequently build up mutual understanding and relationship (Boisot, 1998).

Parikh (2001, p30) identifies the main stages of the knowledge management cycle and IT support required. These main stages are knowledge acquisition, knowledge organisation, knowledge dissemination, and knowledge application.

- Knowledge acquisition: pull technology, search agents, embedded scanners, groupware;
- Knowledge organisation: data warehousing / DBMS, data repositories / compression, filtering/ structuring agents, knowledge maps and links;
- Knowledge dissemination: intra-extra networks, push technology, security / firewall, customising / publishing agents.
- Knowledge application: decision support systems, data mining software, case-based reasoning, work flow systems.

Information and communication technology favours transfer of knowledge that can be codified and reduced to data (Roberts, 2000). By comparison, the significance of tacit knowledge is often overlooked. Knowledge transfer can be considered within the context of a broad definition of technology transfer. As Charles and Howells (1992, p3) describe, technology transfer is "the diffusion of the complex bundle of knowledge which surrounds a level and type of technology". This includes transfer of information and knowledge at a micro- and macro-level between individuals, organisations, and economies. On the other hand, the role of people in initiating and facilitating transfers of knowledge and technology through person-to-person communications is arguably the most important dimension. Therefore, knowledge transfer is affected by every factor that encourages or inhibits inter-personal communications. Codified, explicit knowledge can be transferred in a tangible embodiment such as blueprints or patents, in machinery, as part of licensing and franchise agreements or trade between agents. However, even when knowledge is codified, much of the tacit element remains uncodified and consequently the transfer of codified knowledge alone may fail to facilitate the successful transfer of knowledge. Tacit knowledge can be gained through 'learning by doing' (Polanyi, 1958), or through a process of demonstration or show-how facilitated through face-to-face contact between the transmitter and receiver (Roberts, 2000). In summary, transfer of tacit knowledge requires a high level of personal contact and a process of socialisation, which are affected by trust and mutual understanding developed in social and cultural contexts. IT alone fails to capture fully the conditions required for the successful sharing of tacit knowledge.

Research on knowledge management has thus far been dominated by an information system or information technology perspective, resulting in an overemphasis on codification of explicit knowledge, suitable for databases and other traditional information systems solutions (Swan et al. 1999b). There is an increasing interest in studying the role of information technology on tacit knowledge transfer. However, the literature does not arrive at a consensus. McDermott (1999) insists that information technology inspires but cannot deliver knowledge management, in that knowledge management is only achieved by connecting people to think together. IT can only facilitate communications and building communities that cross teams, disciplines, time, space, and business units. Whilst information retrieval systems such as "recommender" systems can be used to exploit such tacit knowledge at the organisational level, without making it explicit, and IT may be used to address knowledge that has not been made explicit. This viewpoint has credited an expanded role of IT in tacit knowledge transfer.

2.4.2 Organisational Memory

Organisational memory is an important aspect of knowledge management. The concept of organisational memory was first systemically elaborated by Walsh and Ungson (1991). Since then, organisational memory has become overworked and confused (Ackerman and Halverson, 2000). Today organisational memory is a parallel terminology to 'knowledge repository' (Kogut and Zander, 1992), 'knowledge storage' (Hedlund, 1994), 'corporate memory' (Beckett, 2000), or 'organisational memory information system' (Wang, 1999), etc. Broadly defined, organisational memory is knowledge, learned from the past organisational experience, that can be brought to bear on present decisions (Walsh and Ungson, 1991).

Authors have since attempted to strengthen the conceptualisation of organisational memory. The majority of research concentrates on debates over what are the components of organisational memory. In consequence, there are various understandings. Most recently Wexler (2002) summarises organisational memory literature into four models: the storage bin model (where to store OM), the narrative model (how to motivate, retrieve and use OM); the innovative model (when to use what information and/or experience to solve which problem); and the political resource model (who gains or loses power in the use of OM), each consisting of memory practice of human, structural and relational capital. In this thesis, the following components of organisational memory are identified:-

- Memory processes. Organisational memory includes the primary processes of capturing, codifying, categorising, storing, upgrading, searching, retrieving, utilising and creating knowledge. Authors adopt different terminologies of memory processes. Lytras et al (2002) list 35 commonly used knowledge management processes. Among all the processes, memory directories has been recognised as a critical process in the functioning of the memory system. Directories serve to identify the existence, location, and means of retrieval of information held by group individuals, and link knowledge owners and user. Knowledge acquired is appropriately categorised and tagged. There is a clear map of different categories of knowledge stored in the memory. Memory directories are particularly important when linking personal expertise, because tacit knowledge is not easily codified and accessed independent of knowledge contributors or possessors (Anand et al 1998).

- IT-based memory. Information technology plays an important role in the functioning of memory processes. It is also noted that information technology plays an increasingly important role in tacit knowledge repositories since it facilitates identification of knowledge providers in the memory and effectively directs knowledge seekers to those providers (Ackerman and Halverson, 2000). The computer-based information systems theory has upgraded technology as a memory site, which is named as 'prosthetic memory'. The prosthetic memory does not come from a person's lived experience in any strict sense, but is embedded in technology and 'worn' by people (Corbett, 2000). These include computers, software, and any other electronic mnemonic aids. However, prosthetic memory tends to formalise and decontextualise memory.

- Personal memory. Organisational memory based on individual psychology theories tends to share a basic assumption that the location of the memory is the individuals and the focus should be on the individual and the personal nature of memory. "Individuals store their organisation's memory in their own capacity to remember and articulate experience and in the cognitive orientations they employ to facilitate information processing." (Walsh and Ungson, 1991). Individuals may keep records as a memory aid, just as organisations do. The organisational theory does not exclude personal memory, such as experiences and skills, but locates organisational memory in the organisation, taking personal memory as a component. Personal memory is more likely stored and retrieved with its contexts, because human memory is story-based (Schank, 1990). However, personal memory is subject to schematisation and socialisation and thus specific details are often distorted and lost (Corbett, 2000).

- Systems and procedures. Systems include management information systems, financial systems, database systems, documentation, knowledge systems, performance measurement systems, planning systems, evaluation systems, decision support systems, filling systems, etc. (Van der Bent et al 1999; Ackerman, 1996). While procedures are such as corporate policies, standard operations, rules, routines, corporate manuals, etc. (Van der Bent et al 1999; Ackerman, 1996). Systems and procedures represent to a large extent the formalised memory in an organisation and dominate organisational operations. Systems and procedures are organisationally embodied, and can reside independent of individuals that generated the systems and procedures (Levitt and March, 1988).

- Cultural memory. Cultural memory is an assemblage of social or collective memory, which fosters a sense of collective identity (Corbett, 2000). The cultural memory referred here is used in a broad sense to include all aspects of the workplace environment. These can be beliefs, ideologies, norms and values, symbols, habits, rituals, work surroundings, stories, etc. (Van der Bent et al 1999; Ackerman, 1996; Nelson and Winter, 1982). Cultural memory is informal and tacit, and often described as 'the way we do things here'.

- Structural memory. Structural memory includes communication channels, departments and groups, networking, task-/responsibilities-/authority structure, etc (Van der Bent et al 1999). Another aspect of the workplace environment is what Walsh and Ungson (1991) call 'ecology'. It is the actual physical structure of an organisation. Ecology encodes and reveals information about the organisation and helps shape and reinforce behaviour prescriptions within an organisation.

- External memory. Some of the organisation's memory may lie outside the organisation (Beckett, 2000). For example, memory about the organisation saved in external contacts (Beckett, 2000). Another important aspect of external memory is related to the ability to access knowledge and learning opportunities outside the organisation, such as suppliers, customers, competitors and networks, etc. Although personal contacts are used as a know-who source, the Internet contributes a great deal to accessing external memory.

These different types of memory are inextricably intertwined, and indeed organisational memory exists in the interactions between different types of memories. As Tuomi (1996, p148) comments, "organisational memory, as a process where the past influences the present, can not be understood by simple focus upon the buffers that mediate this influence over time, but the influencing process itself needs to be considered as well." Organisational memory as a metaphor suggests the promise of infinitely retrievable, usable, accurate and relevant knowledge. This ideal form of organizational memory offers the possibility of combining and optimising existing technical and social mechanisms (Ackerman, 1996).

Theorists cannot agree whether organisational memory is functional (e.g. Pfeffer, 1983) or dysfunctional (e.g. Starbuck and Hedburg, 1977) in terms of organisational performance and adaptability to change. On one hand, organisational memory was in the past recognised as a source of organisational inertia (Walsh and Ungson, 1991; Weick, 1979). The tendency for existing knowledge to restrict the range of options is a common challenge for innovation (Moorman and Miner, 1998b). On the other hand, authors have emphasised the positive role of organisational memory from different angles. Hart and Baker (1994) provide a breakdown analysis for memory requirements in the new product development process. Common sense tells us that it is better to learn from past success, which provides valuable guidelines for future activities, and learn from past mistakes to avoid repeating similar mistakes in the future.

A primary advantage of organisational memory is the freedom of access of codified knowledge from the knowledge contributors, as Hansen et al (1999) note that knowledge repositories allow many people to search for and retrieve codified knowledge without having to contact the person who originally developed it. In addition, organisational memory allows the centralisation and structuration of otherwise scattered information, and promotes knowledge preservation, sharing, retrieval and reuse (Ackerman and Malone, 1990; Hamel and Prahalad, 1994; Wijnhoven, 1998). All these open up the possibility of achieving scale in knowledge reuse, and affects organisational efficiency by improving employees' ability to access to others' codified knowledge. The use of organisational memory is based on the assumption that knowledge stored will be used by others in the organisation, and the costs of entering it into the repository are smaller than the benefits it generates (El Sawy and Bowles, 1997; Alavi and Leidner, 2001).

This above confusion about the impact of organisational memory on performance is partly because of the early dominant use of psychological models of individual memory by researchers that studied organisational memory (Bannon and Kuutti, 1996). Current social theory of memory calls for a broader conceptualisation of organisational memory involving development of computer-based organisational memory systems (Corbett, 2000). As a growing field of research, organisational memory has attracted discussions of various perspectives to enrich the understanding of organisational memory. In sum, this thesis has identified the following issues in relation to effectiveness of organisational memory: -

- Relevancy and accuracy: Organisational memory should incorporate relevant information and knowledge (Anand et al 1998) and ensure its maximum accuracy (Weick, 1979). Knowledge consistency checking, classification, updating etc are essential in optimising knowledge repositories, and increase their usefulness, accuracy, and updatedness (Gray, 2001).

- Accessibility and availability: A key function of organisational memory is to render retained organisational knowledge more retrievable and make knowledgeable organisational members more accessible (Corbett, 2000; Anand et al 1998; Garud and Nayyar, 1994; Moorman and Miner, 1997). Knowledge distribution is an important part of organisational memory (Weick, 1979).

- Forward looking: Unlike traditional psychological model of memory, the social theory of organisational memory is forward looking rather than backward. In this view, memory informs how companies organise the present and construct strategies with which one might imagine a liveable future (Corbett, 2000). Memories of the past are fallible precisely because memory is reconstructive - the recall of memories represents the positing of an intelligible order to the past from the vantage point of the present (Freeman, 1993). Research on social memory reveals how reality is reconstructed as an outcome of shared memories, rather than an input to their construction (Fentress and Wickham, 1992).

- Forgetting: Disrupting and recreating organisational memory when changes in an organisation's environment have rendered the existing memory obsolete (Anand et al 1998). Tuomi (1996) argues that the fundamental question about organisational memory systems concerns what should be remembered and what should be forgotten. Although forgetting is important in learning, it is a difficult task since personal and cultural memories cannot easily be dis-embodied and re-embodied within organisations (Corbett, 2000).

These factors are complementary to traditional psychological models of memory and adjusted to meet the needs of changing environments. The measurement of organisational memory is a complex task. Nevertheless, a growing body of work has begun to address this (Cohen and Bacdayan, 1994; Cohen and Levinthal, 1990; Epple et al 1991; Moorman & Miner, 1997, 1998a, b; Walsh, 1995; Walsh and Ungson, 1991). Cohen and Bacdayan (1994) and Moorman and Miner (1998a) provide important evidence that we can both define and measure memory at the collective level.

2.4.3 Knowledge Sharing

Knowledge sharing is a very important aspect of effective knowledge management. Drucker (1997) reckons that harnessing the intelligence and spirit of people at all levels of an organisation to continually build and share knowledge as a top priority for organisations to succeed. Indeed, today's competitive advantage increasingly requires the open sharing of knowledge by organisational members (Villadsen, 1995; Bank, 1996; Mullin, 1996; Bukowitz and Petrash, 1997; Stewart, 1997). There is a growing awareness and urgency for a more systematic approach to knowledge sharing in order for knowledge to be quickly leveraged, grown and expanded.

Knowledge sharing emphasises the concept of knowledge-in-motion: effective knowledge management requires a constant flow of knowledge, rather than a stock of it. Flow is what facilitates the connections between seekers of specific knowledge and the providers of needed knowledge (Holtshouse, 1998). Schulz (2001) defines knowledge flow as the aggregate volume of know-how and how information transmitted per unit of time, and captures the overall amount of know-how and information transmitted between subunits in all kinds of ways, including via telephone, email, regular mail, policy revisions, meetings, shared technologies, and reviews of prototypes. Knowledge flow is the way knowledge travels and grows within an organisation. It is more about the human elements than the technology that supports it. Different elements of knowledge flow are emphasised in various theories. For example, learning theories focus on the acquisition and sharing of knowledge as primary mechanisms (Huber, 1991; Levitt and March, 1988); knowledge-based approaches view organisations as primary vehicles for producing, transferring, and combining knowledge (Kogut and Zander, 1992; 1993); international management theories conceptualise organisations as networks that facilitate inter-organisational knowledge sharing (Bartlett & Ghoshal, 1989; Egelhoff, 1991; Gupta and Govindarajan, 1991, 1993); and recent empirical research examines determinants of knowledge flows in organisations (Ghoshal et al 1994; Kostova, 1998; Szulanski, 1996).

Notions of knowledge sharing vary. Some understand knowledge sharing as transfer of skills and technology between organisational subunits (Gupta and Govindarajan, 1994) or transfer of best practices (Darr et al 1995; Szulanski, 1996). Others understand knowledge sharing as a multistage process that might involve initiation, implementation, ramp-up and integration (Szulanski, 1996). The following types of knowledge sharing have been identified in this thesis:-

- Knowledge sharing up and down the management reporting line: This involves sharing behaviour between superiors and subordinates in the organisation. This is distinguished from traditional workflow, where knowledge travels from the beginning of a work process, along a linear direction, to the end of this work process. Effective knowledge sharing requires two-way communications between people at different levels of organisational structure. Additionally, effective knowledge sharing requires a flatter, and more flexible organisational structure to enable knowledge flow freely penetrating different levels of management.

- Communities of practice: These are activity systems where groups of people share a concern, a set of problems, or a passion about a topic, and deepen their knowledge and expertise in this area by interacting on a regular basis to achieve outcomes for both stakeholders and personal development and learning (Lave and Wenger, 1991). Communities of practice are not a form of formal structure, but a process existing in the minds of their members in the connection that they have with each other, and with the larger institution in which they reside. Communities of practice have been claimed as a very useful way of sharing tacit knowledge.

- Knowledge sharing by contributing to organisational memory: Organisational members may share knowledge through voluntary input into organisational knowledge repository, so that other people may retrieve this knowledge and reuse it. This is applicable to knowledge that can be easily codified and stored independent of the knowledge contributor (Levitt and March, 1988). For knowledge that is tacit and is difficult to codify without losing its context, an alternative approach is to share this knowledge directly through person-to-person interactions (Feldman and March, 1981).

- Inter-organisational knowledge sharing: Knowledge sharing is a central theme of literature on networks and strategic alliances. The primary incentive of inter-organisational knowledge sharing is to exploit knowledge complementarity. This complementarity may come from knowledge of exploitation of economic scale, market entry, managing strategic uncertainty, managing costs and risks, and other tacit collusion (Kogut, 1988; Hennart, 1988). In the case of inter-organisational knowledge sharing, both knowledge-specific variables (i.e. tacitness and complexity), and partner-specific variables (i.e. prior experience, culture distance, and organisational distance) impact knowledge sharing between network companies (Simonin, 1999). Effective inter-organisational knowledge sharing depends on firms' absorptive capacity, causal ambiguity, and the arduousness of the relationship between partner firms (Szulanski, 1996).

Within existing literature, there is not a comprehensive construct measuring knowledge sharing. Moorman and Miner (1997) refer to knowledge sharing specifically in terms of memory dispersion, which is "the degree to which organisational memory is shared throughout the relevant organizational unit" (p103). If memory is widely shared, knowledge dispersion is high. They measure this memory dispersion in terms of the degree of consensus among the people working on the product for the certain new product areas, including product design, brand name, packaging, promotional content, and product quality level. In Moorman and Miner (1998b), knowledge sharing is measured in terms of organisational real-time flows.

2.4.4 A Learning Culture

A learning culture is most important for organisations to succeed in knowledge management programs, and indeed underpins the effective usage of knowledge systems and organisational memory, and promotes knowledge sharing. The use of organisational memory creates a set of conditions that allow managers to increase their control over most employees, and explores the conditions under which the use of repositories is likely to reduce employee power (Gray, 2001). Knowledge repositories disconnect seekers from providers and significantly reduce a provider's control over who has access to this knowledge. It is, therefore, not surprising that employees are sometimes resistant to contributing to knowledge repositories. Organisations need to empower employees to contribute to the knowledge repository in order to avoid risk of forfeiting competitive advantage (Johnson and Paper, 1998). On the other hand, knowledge flow also requires a work environment that nurtures and accelerates the sharing of knowledge. A learning culture has been recognised by many authors as a prerequisite to effective knowledge management (De Long and Fahey, 2000; Perez-Bustamante, 1999; Davenport et al 1998; Popper and Lipshitz, 1998). It opens up informal and formal channels to dialectical thinking, debates, and critiques, and enables people to manage the knowledge review process effectively (Huber, 1991). A learning culture "nurtures competence for accentuation of past successes, evoking images of possible futures, nourishing a spirit of restless inquiry, generating hope in the human capacity to deliberately notice, anticipate and nurture positive potential" (Barrett and Peterson, 2000, p10).

On the conceptual side, there is a wide range of depiction of what a learning culture is like. For example, Davenport et al. (1998) emphasise that a 'knowledge-friendly' culture is one of the most important factors for a knowledge management project's success, and one of the most difficult to create if it does not already exist. There are several components of organisational culture that are key to successful knowledge management projects:-

- People have a positive orientation to knowledge – employees are bright, intellectually curious, willing and free to explore and executives encourage their knowledge creation and use;
- People are not inhibited from sharing knowledge – they are not alienated or resentful of the company and don't fear that sharing knowledge will cost them their jobs;
- The knowledge management projects fit with the existing culture.

Popper and Lipshitz (1998) propose a learning culture that includes five hierarchically arranged values: continuous learning, valid information, transparency, issue orientation, and accountability:

- Continuous learning is located at the apex of the hierarchy. It is valued in learning organisations for surviving (De Geus, 1988; Garvin, 1993; Nystrom and Starbuck, 1984; Senge, 1990).

- Valid information is one of the governing variables that inform double-loop learning, because all learning in organisational contexts involves the transformation of data into knowledge, and procurement of full, undistorted, and verifiable information is necessary for both single- and double-loop learning (Argyris and Schon, 1978)

- Transparency is the willingness to hold oneself open to inspection in order to receive valid feedback. Holding transparency as a value that guides one's actions serves valid information by decreasing the likelihood of self-deception and by countering pressures to distort or suppress threatening information. Transparency is encouraged by legitimising the admission of error (Popper and Lipshitz, 1998). The concept of 'information environment' by Huber and Daft (1987) clarifies the relationship among transparency, valid information and organisational learning. "Information environment can be thought of as having characteristics such as completeness, unbiasedness, and clarity, that may be important predicators of organisational learning." (Huber, 1991, p99).

- Issue orientation is manifested when opinions and assertions are judged according to their merits, divorced from the identity and status of the person pronouncing them (Popper and Lipshitz, 1998). It is related to (but is more focused than) democratisation, power equalization, and participation, and opens up communication channels and thus enhancing innovation and learning (Kanter, 1989; McGill et al., 1993; Weisbord, 1987).

- Accountability is holding oneself responsible for one's actions and their consequences and for learning from these consequences (Popper and Lipshitz, 1998). It facilitates overcoming obstacles to effective learning in the form of action barriers that prevent the implementation of lessons learned (March and Olsen, 1976; Shaw and Perkins, 1992).

On the empirical side, there is little research in the specific area of a knowledge or learning culture. In more generic terms, Deshpande et al (1993) study corporate culture in relation to organisational innovativeness, adapting a measurement construct from Campbell and Freeman (1991) and Quinn (1988). Jaworski and Kohli (1993) reflect organisational culture through constructs of organisational systems and interdepartmental dynamics and study their relationship with market orientation. Subramanian and Nilakanta (1996) examine organisational characteristics in terms of formalisation, centralisation and specialisation, and the relationship with innovativeness. Hurley (1995) and Hurley and Hult (1998) identify four dimensions of group culture that impact innovativeness: participative decision-making, power sharing, support and collaboration, and learning and development. Hult et al (2000) further study organisational culture within a purchasing environment and identify three factors: localness, transformational leadership, and openness.

2.4.5 Knowledge Benchmarking

Benchmarking is commonly referred to as "the search for industry best practices that will lead to superior performance" (Camp, 1989). The areas that companies tend to benchmark include products, services, and related processes across different national or business boundaries. In current practice, only very few companies are benchmarking in terms of their intangible, and non-financial performance measures and metrics. With the increasingly recognised importance of information and knowledge management, benchmarking in intellectual capital or knowledge assets has become critical in improving company performance. Indeed, the only thing that gives an organisation a competitive edge, and the only thing that is sustainable, is what a company knows, how it uses what it knows, and how fast it can know something new. Knowledge management has become the only source of sustainable competitive advantage (Prusak, 1996).

Knowledge benchmarking is here referred to the process of measuring an organisation's knowledge assets against other organisations in order to identify the knowledge gap, and by adopting industry best practices, improving its capabilities of managing knowledge to attain sustainable competitive advantage in the marketplace. Effective knowledge benchmarking requires a thorough and systematic measurement of an organisation's knowledge assets, the processes of knowledge management, and most importantly the contexts of knowledge management, namely strategy and leadership, culture, and technology. These elements have been captured in the American Productivity & Quality Centre's Knowledge Management Framework (1996) (see Figure 2.2).

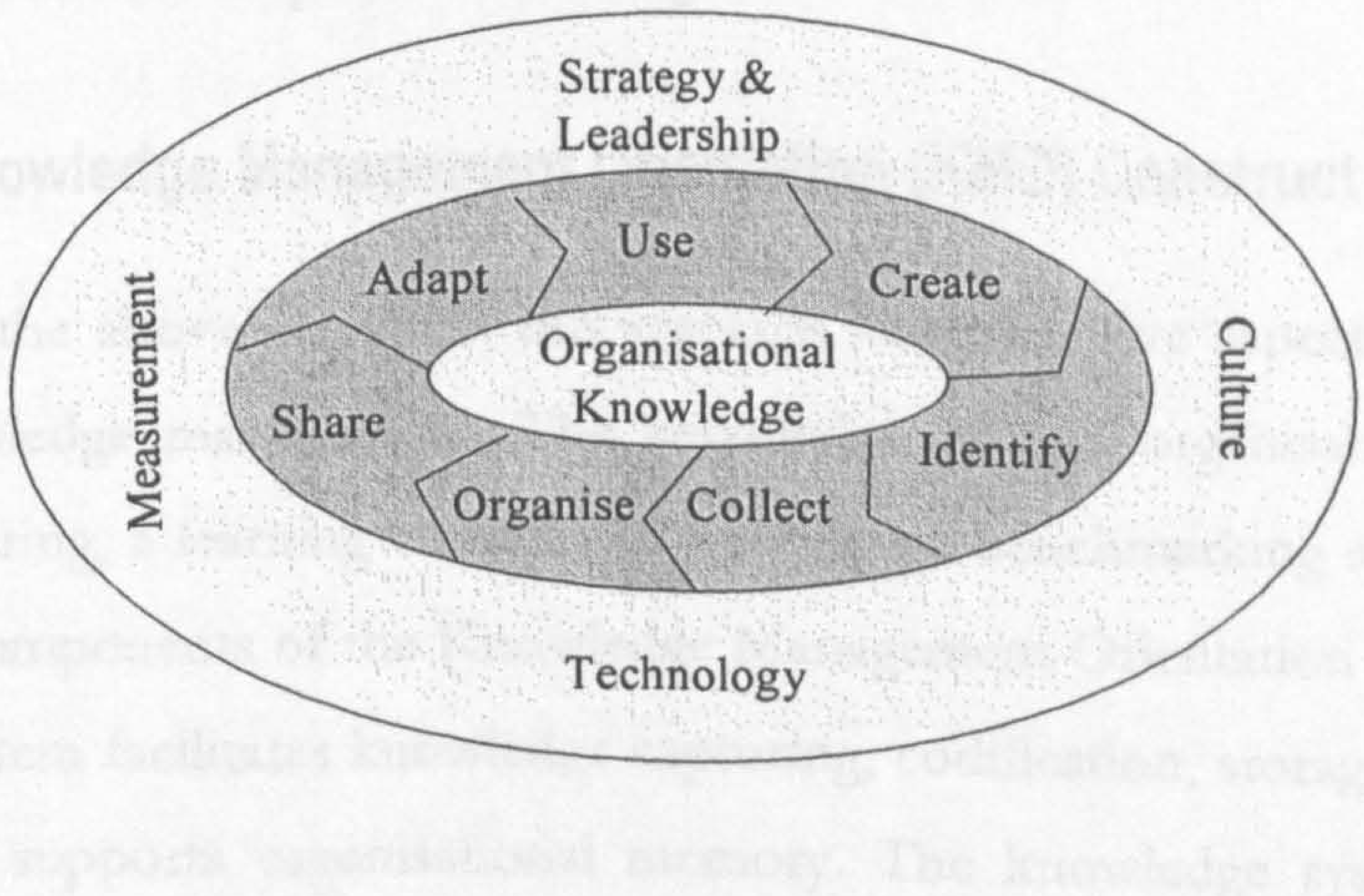


Figure 2.2 American Productivity & Quality Centre (1996) Knowledge Management Framework

At another level, Boxwell (1994) identifies several different methods of knowledge benchmarking:

- Competitive benchmarking entails measuring your functions, processes, activities, products or services against those of your competitors and improving your own.
- Co-operative benchmarking involves cooperation and knowledge sharing with best-in-class firms who are usually not direct competitors of the benchmarking company.
- Collaborative benchmarking involves a group of companies sharing knowledge about a particular activity, all hoping to improve based upon what they learn.
- Internal benchmarking is a form of collaborative benchmarking that many large organisations use to identify best in-house practices and disseminate the knowledge about those practices to other groups in the organisation.

Maria and Marti (2001, p162) summarise the benefits of undertaking intellectual capital benchmarking, including learning from one's betters to surpass one's own competitive position; identifying the specific competitiveness factors and criteria that are relevant in a given business activity; and enabling the identification, audit and benchmarking of the core competencies or key intellectual capital that are the main sources of sustainable competitive advantages.

2.4.6 The Knowledge Management Orientation (KMO) Construct

Incorporating the above literature, this research identifies five aspects that underlie effective knowledge management. The knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking are integral and inter-twined components of the Knowledge Management Orientation construct. The knowledge system facilitates knowledge capturing, codification, storage and retrieval, and therefore supports organisational memory. The knowledge system promotes dialogues and communications, through which knowledge flows and knowledge sharing occurs. The knowledge system also functions in accessing external information and knowledge and facilitates knowledge benchmarking. Organisational memory varies in the degree to which it is dispersed, or shared, throughout the organisation (Moorman and Miner, 1997). Organisational memory is not always centrally stored, but distributed across different retention facilities (Walsh and Ungson, 1991). Therefore, organisational memory by its nature involves some degree of dispersion throughout the organisation. Knowledge sharing is critical to knowledge flow and growth over time, which in turn provides a better chance to enlarge and enhance organisational memory. Knowledge sharing also promotes a culture based on trust. People feel more willing to contribute to knowledge repository. Additionally, effective organisational memory and knowledge sharing require a learning culture, featured by transparency, issue orientation, accountability, rewards and incentives, etc. Whilst knowledge benchmarking enables a systematic assessment of an organisation's knowledge management capability and identification of knowledge management gaps. Through learning from benchmarking partners and adopting industry best practices, organisations can achieve a higher level of performance outcomes. Knowledge benchmarking is also associated to organisational memory because an effective organisational memory improves the absorptive capability, which in turn affects the organisation's ability to learn new knowledge. These five components and their key points are summarised in Table 2.7.

2.5 CONCLUSIONS

The role of knowledge management in organisational performance has been a focus in both academic research and industrial practices. However, the area has been under-developed, particularly in empirical terms, due to lack of effective measurement constructs of knowledge management performance. This chapter, through defining Knowledge Management Orientation, sets up a construct to measure knowledge management performance. The five components of the construct, i.e. the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking, are intertwined, incorporating three elements of knowledge management, i.e. people, technology and processes. This construct will be used to measure an organisation's overall knowledge management capabilities, and the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and bottomline organisational performance.

Table 2.7 The Components Of Knowledge Management Orientation

KMO Variables	Descriptions	Authors
Knowledge System		
Storage of codified knowledge	Codified knowledge stored in terms of documents, online database, etc.	Liebowitz and Beckman (1998); Olivera (2000); Hansen et al (1999); Zack (1999b)
IT facilitation of knowledge repository	IT support in terms of capturing, codifying, storing and retrieving knowledge	McDonald and Ackerman (1998); Hansen et al (1999); Bloodgood and Salisbury (2001);
IT facilitation of knowledge flow	IT support in terms of creating dialogues and networks	Roberts (2000); Bloodgood and Salisbury (2001);
Organisational Memory		
Maintenance of knowledge repository	Knowledge consistency checking, classification, updating, etc.	Gray (2001); Anand et al (1998); Corbett (2000); Garud and Nayyar (1994); Moorman and Miner (1997)
Storage of tacit knowledge	Tacit knowledge stored in terms of experience and skills, structures, cultures and ecology	Walsh and Ungson (1991); Gray (2001)
Use of directory of organisational memory	Directories serve to identify the existence, location, and means of retrieval of information held by group individuals.	Anand et al (1998)
Knowledge Sharing		
Sharing behaviour up and down the management reporting line	Knowledge flow up and down the management reporting lines	Holthouse (1998); Schulz (2001); Ghoshal et al (1989); Kostova (1998); Szulanski (1996)
Communities of practices	Knowledge sharing between staff performing similar or complementary roles	Holthouse (1998); Wenger (1998); Lave and Wenger (1991)
Sharing behaviours via knowledge repository	Knowledge sharing via knowledge repository	Feldman and March (1981); Levitt and March (1988); Hansen et al (1999)
External orientation of knowledge sharing	Knowledge sharing across departmental, functional and organisational boundaries	Kogut (1988), Hennart (1988); Simonin (1999); Szulanski (1996)

A Learning Culture		
Knowledge-friendly	Positive orientation to knowledge, allowing mistakes, debates and knowledge overlapping.	Davenport et al (1998); Marchand et al (2000); De Long and Fahey (2000)
Valid information	Procurement of full, undistorted, and verifiable information	Popper and Lipshitz (1998); Weick (1979); Argyris and Schon (1978)
Transparency / openness	Willingness to hold oneself open to inspection in order to receive valid feedback.	Popper and Lipshitz (1998); Hult et al (2000); Huber and Daft (1987)
Issue orientation	Opinions and assertions are judged according to their merits.	Popper and Lipshitz (1998); Kanter (1989); McGill et al (1993); Weisbord (1987)
Accountability	Holding oneself responsible for one's actions and their consequences and for learning from these consequences.	Popper and Lipshitz (1998); March and Olsen (1976); Shaw and Perkins (1992)
Reward systems	Incentives underscore learning and sharing.	Nemeth (1997), Jaworski and Kohli (1993)
Knowledge Benchmarking		
Learning from benchmarking	Using benchmarking knowledge to improve business performance	O'Dell et al (1999); Maria and Marti (2001); Marti (2001)
Internal benchmarking	Using knowledge acquired within the organisation	Boxwell (1994); Marti (2001)
Competitive benchmarking	Accessing of knowledge on competitors and market changes	Boxwell (1994); Marti (2001)
Cooperative benchmarking	Networks of sharing knowledge with other organisation.	Boxwell (1994); Marti (2001)

Chapter Three

Organisational Capabilities & Performance Indicators

* * * * *

3.1 INTRODUCTION

Performance is the ultimate goal of organisations. Organisational initiatives and programs have to eventually lead to better performance. The increasing interest in knowledge management also calls for attention to whether knowledge management leads to better organisational performance. This forms a key focus of this research. However, selecting organisational performance indicators deserves careful consideration. Generally speaking, there is not a clear guideline to choose an appropriate measure of organisational performance, and no single measure of performance can fully account for all aspects of organisational performance (Snow and Hrebiniak, 1980). Consequently, multiple measures of organisational performance have been used, but their selection has been rather arbitrary and without any basis in theory (Subramanian and Nilakanta, 1996). The common dichotomous view measures organisational performance in terms of efficiency (i.e. lowering costs) and /or effectiveness (i.e. providing more appropriate services). Measures of efficiency have a cost-benefit focus, comprising a ratio of some inputs and outputs, such as return on assets, return on equity and other financial ratios (Ramaswamy et al 1993). Measures of effectiveness have a revenue generation focus and are measured by variables such as market share, sales, etc (Subramanian and Nilakanta, 1996). At a broader level, Counte et al (1995) suggest that efficiency should be assessed in three areas – financial, operations, and human resources; and effectiveness be assessed in four areas – financial, operations, human resources and market. However, these bottomline 'hard' approaches to performance measurement do not reveal the dynamic nature of knowledge management performance. For example, knowledge management may have significant impact on an organisation's learning orientation, market orientation, and innovative orientation etc. and subsequently impacts on performance. The indirect impact of knowledge management orientation on enhancing an organisation's distinctive capabilities cannot be neglected. This chapter reviews literature on organisational performance and selects performance indicators for further study.

3.2 POSITIONAL ADVANTAGE AND PERFORMANCE

In business society, executives are mainly interested in the bottomline, i.e. financial performance or profitability for both products and services (Jacobson and Aaker, 1987; McDermott et al, 1993; Phillips et al 1983; Rust et al 1995). The limitation of these measures is widely recognised. In the current highly competitive marketplace, firm performance is ultimately based on its distinctive capabilities and the ability to transfer these capabilities into competitive advantage in the marketplace. Consequently, more attention has been paid to soft measures of performance, such as innovation, learning, customer satisfaction, employee satisfaction, etc. which are incorporated into the balanced scorecard (Kaplan and Norton, 1992) and the European Foundation for Quality Management Model.

3.2.1 Competitive Advantage

Competitive advantage is a core concept in strategic management research. The reigning incumbent explanation for the heterogeneity of firm performance is based on the concept of competitive advantage. Competitive advantage, on one hand, is defined in relation to particular properties of individual product markets, which will give the firm a strong competitive position (i.e. Ansoff, 1965). Aaker (1984) emphasises that a competitive advantage should (1) be a strength of the organization, relative to competitors; (2) be substantial, sustainable and measurable; and (3) involve a key success factor of the market, i.e. it must be important to the consumer. The concept of competitive advantage was later associated with the Harvard Business School and popularised by the work of Porter (1980, 1985). Porter (1985) states that there are two generic competitive advantages: a cost advantage or a differentiation advantage.

Recent work such as Amit and Schoemaker (1993), Barney (1991), Conner (1991), Ghemawat (1986) and Porter (1985) expand the concept of sustained competitive advantage, which is the idea that some forms of competitive advantage are very difficult to imitate and can therefore lead to persistent superior economic performance (Wiggins, 1997). The notion of sustained competitive advantage is of particular interest to strategists in that most efforts are dedicated to find out those advantages that can be sustained for long periods of time yielding sustained superior performance. Barney (1991) suggests "a firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy" (p102). Of the more interesting aspects of conceptual discussions is what exactly is meant by 'sustained'. Porter (1985) did not give a formal conceptual definition, but uses 'long-term profitability' (p1) and 'above-average performance in the long run' (p11). While Barney (1991) argues against using a calendar time, and defines that a sustained competitive advantage is a competitive advantage that "continues to exist after efforts to duplicate that advantage have ceased" (p102). Wiggins (1997) recommends that Barney's definition is theoretically more precise, but virtually impossible to meaningfully operationalize.

3.2.2 The Resource-based View

In contrast to the classical competitive advantage theory, the resource-based view focuses on analysis of firm-specific assets and distinctive capabilities as sources of competitive advantage, and defines competitive advantage as 'distinctive competence' in terms of relative superiority in skills and resources (i.e. Penrose, 1959). The main argument of the Resource-Based View (RBV) is that both strategy scholars and managers often fail to recognise that a bundle of assets, rather than the particular product-market combination chosen for its deployment, lies at the heart of their firm's competitive position (Wernerfelt, 1984; Dierickx and Cool, 1989). This viewpoint is complementary to previous work in strategic management, which either gives equivalent attention to firm strengths and weaknesses versus the opportunities and threats in the competitive environment (Andrews, 1971; Ansoff, 1965; Learned et al 1965), or emphasises external, industry-based competitive forces (Porter, 1980).

The RBV incorporates the traditional concept of strategy (Andrews, 1971; Ansoff, 1965). Organisations with strategic capability to focus and coordinate human effort and the ability to evaluate effectively the resource position of the firm in terms of strengths and weaknesses have a strong basis for competitive advantage (Andrews, 1971). A firm may achieve rents not because it has better resources, but rather the firm's distinctive competence involves making better use of its resources (Penrose, 1959, p54). For example, the firm may make better allocation of financial capital toward high yield uses (Williamson, 1975), or make better use of people by correctly assigning them to where they have higher productivity in the organisation (Tomer, 1987). To transform resource advantage to sustained competitive advantage, the firm must possess unique capabilities in terms of technical know-how and managerial ability (Mahoney and Pandian, 1992). In particular, distinctive competence and superior organisational routines in one or more of the firm's value chain functions may enable the firm to generate rents from a resource advantage (Hitt and Ireland, 1985).

3.2.3 Positional Advantage

Later studies, drawing on both the classical competitive advantage theory and the resource-based view argue that neither of these meanings alone gives a complete picture, but taken together they describe both the stage of advantage and how it was gained (i.e. Day and Wensley, 1988). This forms the concept of positional advantage - positional and performance superiority is a consequence of relative superiority in the skills and resources a business deploys. A simplified framework of this position advantage is source (of advantage) → position (of advantage) → performance (Day and Wensley, 1988). Successive studies have made a clearer distinction between the skills and capabilities within the business, and the competitive positional advantage in the marketplace (Coyne, 1986; Aaker, 1988; Day and Wensley, 1988). The skills and capabilities collectively provide the potential for competitive advantage. While competitive positional advantage is only achieved when the distinctive skills and capabilities are translated into a price or value differential in the market.

Recent research by Hult and Ketchen (2001) draws on the viewpoint of positional advantage and identifies four capabilities: market orientation, entrepreneurship, innovativeness and organisational learning, as the first-order indicators of positional advantage (Day, 1994b; Day and Wensley, 1988). These four capabilities are each necessary, but are not individually sufficient for creating positional advantage, but rather that they can collectively contribute to the creation of a unique organisational competence (Day, 1994b, Hult and Ketchen, 2001). Hult and Ketchen (2001) find that the higher-order, intangible positional advantage via the first-order indicators of market orientation, entrepreneurship, innovativeness and organisational learning, has a positive effect on large multinational corporations performance (in terms of five-year average change in return-on-investment, five-year percentage change in income, and five-year percentage change in stock price) (see Figure 3.1). This model not only provides a framework of distinctive organisational capabilities that can be used as performance indicators, but also links capabilities to positional advantage and consequently bottomline financial measures of performance outcomes.

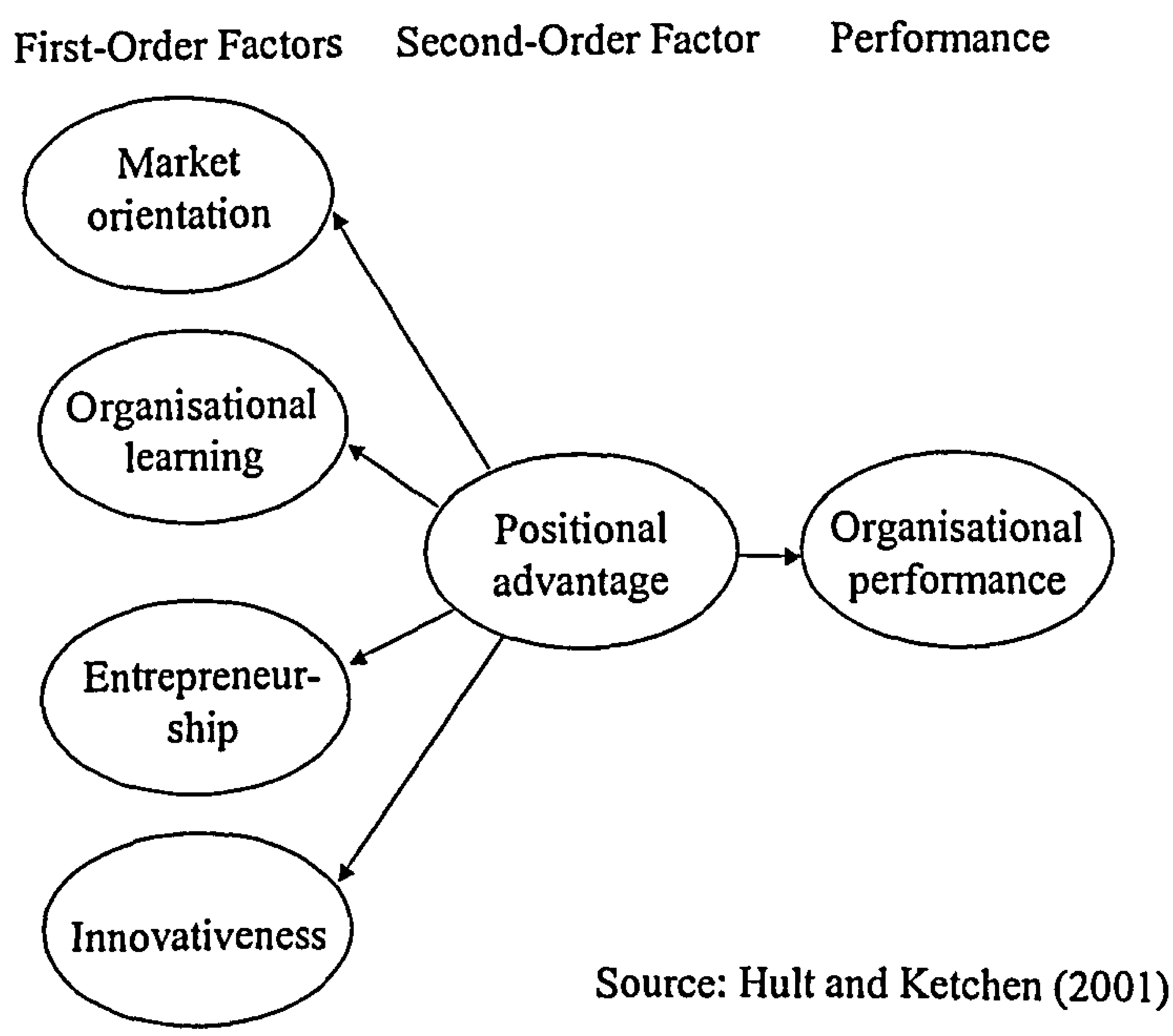


Figure 3.1 Positional Advantage

The above discussions reveal that bottomline performance indicators are not sufficient to measure an organisation's success in the marketplace. More and more attention has to be paid to the aspects of organisational capabilities that can eventually lead to better performance, such as market orientation, learning orientation and innovative orientation. There is a long proclamation that a business that increases its market orientation will improve its market performance (Levitt, 1960; Kotler, 1984; Webster, 1988; Narver and Slater, 1990). Organisational learning is a strategic capability (Smith et al 1996), which through behaviour change leads to improved performance (Fiol and Lyles, 1985; Garvin, 1993; Senge, 1990; Sinkula, 1994). Whilst innovative orientation is considered as a major source of competitive advantage (Bolwijn and Kumpe, 1990; Cozijnsen, 2000). An organisation's capability of managing knowledge has recently been recognised as a source of competitive advantage. The relationships between knowledge management orientation and organisational learning, market orientation, and innovative orientation are of increasing interest. Existing research findings and conceptual thinking regarding these relationships are elaborated in Chapter 4 Research Models and Hypothesis. This chapter focuses on literature review of concepts and operationalisation of market orientation, learning orientation and innovative orientation.

3.3 MARKET ORIENTATION

Slater and Narver (1995, p63) note that "a market orientation is valuable because it focuses the organization on (1) continuously collecting information about target-customers' needs and competitors' capabilities and (2) using this information to create continuously superior customer value". The literature views market orientation both as a form of culture and as a specific set of behaviours (Despande et al. 1993; Kohli and Jaworski, 1990). The most widely used measurement scales of market orientation are MARKOR developed by Kohli et al (1993) and MKTOR developed by Narver and Slater (1990).

3.3.1 Definitions of Market Orientation

The marketing concept and the related construct of market orientation have long been important elements of research and practice (Hult and Ketchen, 2001). As any other concepts, the conceptualisation of market orientation has received criticism. For example, Dreher (1993) argues that there is an original ambiguity concerning the nature of market orientation: is it a business philosophy or a set of activities? Gabel (1995) comments that the concept is not clear and well circumscribed, and its current operationalisation presents several insufficiencies in comparison with Churchill's (1979) paradigm, which entails, in addition to the fundamental specification of the domain of a construct, the generation of a large sample of items and an iterative purification procedure with several data collections.

Market orientation is mixed with other terminologies such as the market concept, marketing orientation and customer orientation in the literature. Indeed, it is not easy to distinguish these concepts, because of their intertwined nature. However, market orientation is preferred in the literature for several reasons: First, market orientation clarifies that the construct is not exclusively a concern of the marketing function. Rather, it is an organisation-wide concern (Kohli and Jaworski, 1990; Narver and Slater, 1990; Shapiro, 1988). Consequently, it is more likely to be embraced by non-marketing departments. In addition, market orientation focuses on markets that include customers and forces affecting them. This is consistent with the broader "management of markets" orientation proposed by Park and Zaltman (1987, p7) for addressing limitations in currently embraced paradigms. On the debate between market orientation and customer orientation, the Strategic Management Journal hosted a series of discussions (Christensen and Bower, 1996; Connor, 1999; Slater and Narver, 1998, 1999). In a comment to Christensen and Bower (1996), Slater and Narver (1998) distinguish market orientation from customer orientation, in that companies with a focus on customer orientation emphasise customers' expressed needs, while companies adopting market orientation develop long-term thinking and endeavour to fulfil customers' latent needs. Slater and Narver (1999) further note that market-oriented companies do not exclude customers' expressed needs but rather stretch to address latent needs as well. On a critique, Connor (1999) posits that market orientation and customer orientation are two ends along a continuum, rather than a dichotomy between them. He posits that companies choose a position along this continuum in order to seek a balance, which is needed to generate funds by satisfying current needs to support long-term projects.

Table 3.1 Definitions Of Market Orientation

Authors	Definitions	Components
Felton (1959, p55)	The market concept is "a corporate state of mind that insists on the integration and coordination of all the marketing functions, which, in turn, are melded with all other corporate functions, for the basic purpose of producing maximum long-range corporate profits".	• Customer focus • Coordinated marketing • Profitability
McNamara (1972, p51)	The marketing concept is "a philosophy of business management, based upon a company-wide acceptance of the need for customer orientation, profit orientation, and recognition of the important role of marketing in communicating the needs of the market to all major corporate departments".	• Customer focus • Coordinated marketing • Profitability
Kohli and Jaworski (1990, p6)	"Market orientation is the organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organisation-wide responsiveness to it."	• Intelligence generation • Intelligence dissemination • Responsiveness
Narver and Slater (1990, p21)	"Market orientation is the organization culture (i.e. culture and climate, Deshpande and Webster, 1989) that most effectively and efficiently creates the necessary behaviours for the creation of superior value for buyers and, thus, continuous superior performance for the business." (Aaker, 1988; Kohli and Jaworski, 1990; Kotler, 1984; Kotler and Andreasen, 1987; Peters and Austin, 1985; Peters and Waterman, 1982; Shapiro, 1988; Webster, 1988).	Behavioural components: • Customer orientation • Competitor orientation • Interfunctional coordination Decision criteria: • Long-term focus • Profitability
Ruekert (1992, p228)	Marketing orientation is "the degree to which an organisation obtains and uses information from customers; develops a strategy which will meet customer needs; and implements that strategy by being responsive to customer needs and wants".	• Customer focus • Strategic planning and implementation • Marketing research

Market orientation is a market oriented business culture and norms (Day, 1990, 1992; Deshpande and Webster, 1989; Narver and Slater, 1990; Shapiro, 1988), which direct to certain behaviour and therefore impact organisational performance. However, early literature stressed the idealistic policy statements represented by the marketing concept (i.e. Felton, 1959; McNamara, 1972) and provided limited practical value (see Table 3.1). Kohli and Jaworski (1990) develop an operational definition of marketing orientation based on the three pillars of the marketing concept: customer focus, coordinated marketing and profitability. They define "market orientation is the organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it."

3.3.2 Measurement of Market Orientation

The widely used measures of market orientation are MKTOR developed by Narver and Slater (1990), and MARKOR developed by Kohli et al (1993). Most recent studies show that neither of the two scales can be used in their original forms (Farrell and Oczkowski, 1997; Oczkowski and Farrell, 1998). Bearing these concerns, Gauzente (1999) compares MKTOR and MARKOR scales via a content analysis method (see Table 3.2), and draws the following points:

3.3.2.1 MKTOR Intra-Scale Analysis:

Narver and Slater (1990) define market orientation as encompassing three components: customer orientation, competitor orientation and inter-functional coordination. However, the scales are over-represented by customer orientation and under-represent competitor orientation and inter-functional coordination. This has already been criticised by Kohli et al (1993). The content analysis reveals a theme of strategic elaboration (see Table 3.2). However, it is not clear whether it really counterbalances the predominance of the customer orientation component. Therefore, MKTOR tends to be a measure of customer orientation rather than market orientation.

Slater and Narver (1995) underline the cultural dimension of market-oriented companies - "market orientation is the culture that (1) places the highest priority on the profitable creation and maintenance of superior customer value while considering the interest of other key stakeholders; and (2) provides norms for behaviour regarding the organizational development and responsiveness to top market information" (p67). This recent definition of market orientation demonstrates a disjunction from its original measurement scale MKTOR, which does not take into account the culture dimension nor its stakeholder dimension.

Slater and Narver (1998, 1999), on debates with Christensen and Bower (1996) and Connor (1999) regarding the distinction between market orientation and customer orientation, particularly stress the long-term thinking and satisfaction of customers' latent needs of companies adopting market orientation. However, the content analysis reveals that MKTOR focuses exclusively on the present tense, which gives a punctual, cross-sectional aspect to the scale.

3.3.2.2 MARKOR Intra-Scale Analysis

Kohli and Jaworski (1990) and Kohli et al (1993) define market orientation as "the organisation wide generation of market intelligence pertaining to current and future needs of customers, dissemination of intelligence within the organization, and responsiveness to it. Key features of this integrated view are (1) an expanded focus on market rather than on customer intelligence, (2) an emphasis on a specific form of inter-functional coordination with respect to market intelligence and (3) a focus on activities related to intelligence processing rather than the effect of these activities" (p468). The content analysis reveals that MARKOR's operationalisation is largely consistent with their theoretical proposals.

MARKOR shows an apparent temporal feature, with words such as 'slow, in a timely fashion, periodically, at least once a year, future, developments, trends, shifts, short period, etc'. This entails two themes: changes in the environment and its scanning; and the reactivity of the organisation. In addition, the verbal forms involve future and conditional formulations, such as 'if a major competitor were to… we would implement…' This points out that market orientation is concerned not only with present but also future needs of customers.

Table 3.2 Content Analysis Of Market Orientation Scales

	MKTOR Narver and Slater (1990) (14 Items)	MARKOR Kohli et al (1993) (Final scale, 20 items)
Number of occurrences (O)	171	355
Number of vocables (V)	90	133
O/V (Vocabulary richness index)	1.9	2.67
% infinitive	-	32.5
% present	100	57.5
% future	-	2.5
% conditional	-	7.5
% past	-	-
Most frequent terms (frequency indicated in brackets)	customer/s (10) competitors /tive (5) and business (5) strategy / ies (4) management / ers (3), needs (3) and functions (3) value (2), satisfaction (2), information (2), understand/ing (2), create (2), target (2)	customer/s (10) business unit (7), department (7). products (6) changes (4) and competition (4) services (3), needs (3), market (3), slow (3), respond/se (3)
Extracted themes	• Attitude concerning clients • Positioning concerning competitors • Strategy elaboration	• Needs and wants of consumers, customer satisfaction • Changes screening and scanning • Time management (periods, regular meetings, surveys) • Departments behaviours within the whole organization

Source: Gauzente (1999)

3.3.2.3 Inter-Scale Comparison

In terms of vocabulary richness ratio, MKTOR is slightly superior to MARKOR. However, this is not significant, since MKTOR is shorter than MARKOR. With regard to the verbal forms, MARKOR exhibits a more varied structure than MKTOR, and thus encourages the respondent to imagine and project into potential business situations. Therefore, MKTOR is more factual and structured as a checklist or diagnosis tool. MARKOR evaluates organisational reactivity and proactivity, and is mostly suited to an evaluation of market orientation as an organisational phenomenon. It is a helpful instrument for assessing a firm's potentialities in terms of ability to respond to external events.

MARKOR is largely consistent with its definition. It is more effective in measuring market orientation as an organisational aspect of activities. While MKTOR is partly consistent with its definition. It is more effective in measuring customer orientation. However, from the statistical viewpoint, MARKOR has a lower reliability than MKTOR (Pelham and Wilson, 1996).

Based on the above discussions, this research adopts the operational definition and the measurement construct by Kohli and Jaworski (1990), which consists of three components: intelligence generation, intelligence dissemination and responsiveness to facilitate cross-comparison with extant research.

3.4 ORGANISATIONAL LEARNING ORIENTATION

The concept of organisational learning has flourished since the 1980s. There is a proliferation of literature regarding its conceptualisation (Levitt and March, 1988; Senge, 1990; Cohen and Sproul, 1991; Argyris and Schon, 1996). However, the definitions bear some concurrent criticism. First, the concept of organisational learning and learning organisation is "excessively broad, encompassing merely all organisational change ... and from various other maladies that arise from insufficient agreement among those working in the area on its key concepts and problems" (Cohen and Sproul, 1991, p1). Similar criticism has been raised by many other authors such as Daft and Huber (1987), Huber (1991), Dodgson (1993b), Garvin (1993), Hawkins (1994), Miller (1996), and Popper and Lipshitz (2000a). Secondly, most of the definitions appear to be complementary rather than fundamentally original or conceptually different (Matlay, 1997). The influx of literature provides overwhelming, but unclear information to both researchers and practitioners. Finally, the prevailing concept of organisational learning and learning organisation bears a strong bias towards the traditional scientific approach to management, and stresses the importance of system thinking and continuous improvement. A few researchers have identified the limitations of the existing framework in current industrial contexts (Lorente, et al., 1999; Kim and Mauborgne, 1999b; Wang and Ahmed, 2003).

3.4.1 Definitions of Organisational Learning

The concept of learning is understood from various perspectives, and mainly developed in the psychological field over a long evolutionary history. It has quickly evolved to cover various aspects of organisational management. Researchers and practitioners intend to provide a holistic description of the domain and create a proliferation of definitions. Through an extensive literature review, Wang and Ahmed (2003) identify six focuses of the concept: focus on collectivity of individual learning; focus on process or system; focus on culture or metaphor; focus on knowledge management; focus on continuous improvement and focus on creativity and innovation (see Table 3.3). In response to the new challenges of creativity and innovation as the source of competitive advantage, Wang and Ahmed (2003, p14) further re-define organisational learning orientation as the process by which the organisation constantly questions existing products, processes and system, identifies strategic position, and applies various modes of learning, to achieve sustained competitive advantage. A learning organisation should dedicate to improve the learning context and strategically strengthen organisation competency to facilitate knowledge creation and innovation, and deliver marketplace-based competency".

Table 3.3 The Concept Of Organisational Learning

Focus	The Concept of Organisational Learning	Practices
Individual learning	"Organisational learning occurs when individuals within an organisation experience a problematic situation and inquire into it on the organisational behalf." (Argyris and Schon, 1996, p16)	Staff training & development
Process or system	Organisational learning is the process whereby organisations understand and manage their experiences. (Glynn, et al., 1992)	Enhancement of information processing and problem solving capability.

Culture or metaphor	"A learning organisation should be viewed as a metaphor rather than a distinct type of structure, whose employees learn conscious communal processes for continually generating, retaining and leveraging individual and collective learning to improve performance of the organisational system in ways important to all stakeholders and by monitoring and improving performance." (Drew and Smith, 1995) "One can conceptualise learning orientation as giving rise to that set of organisational values that influence the propensity of the firm to create and use knowledge. Learning orientation influences the degree to which an organisation is satisfied with its theory in use and, hence, the degree to which proactive learning occurs" (Sinkula et al 1997, p309)	Creation and maintenance of learning culture: collaborative team working, employee empowerment and involvement, etc.
Knowledge management	Organisational learning is the changes in the state of knowledge (Lyles, 1988, 1992). It involves knowledge acquisition, dissemination, refinement, creation and implementation: the ability to acquire diverse information and to share common understanding so that this knowledge can be exploited (Fiol, 1994) and the ability to develop insights, knowledge, and to associate among past and future activities (Fiol and Lyles, 1985).	Facilitation of interaction and strengthening of knowledge base.
Continuous improvement	"A learning organisation should consciously and intentionally devote to the facilitation of individual learning in order to continuously transform the entire organisation and its context." (Pedler et al., 1991)	The adoption of TQM practices.
Creativity and innovation	In hyperdynamic business contexts, organisational learning is the process by which the organisation constantly questions existing products processes and systems, identifies strategic position, and applies various modes of learning, to achieve sustained competitive advantage. A learning organisation should dedicate to improve the learning context and strategically strengthen organisation competency to facilitate knowledge creation and innovation, and deliver marketplace-based competency (Wang and Ahmed, 2003).	The pursue of creative quality and value innovation

Source: Adapted from Wang and Ahmed (2003)

3.4.2 Measurement of Learning Orientation

Literature on organisational learning exhibits a considerable interest with respect to the theoretical development of the concept, but despite this, there is a dearth of operational constructs. This is partly due to the various focuses of the concept (see Table 3.3). Sinkula et al (1997) suggest a market-based organisational learning framework and measure learning orientation in terms of values – "one can conceptualise learning orientation as giving rise to that set of organisational values that influence the propensity of the firm to create and use knowledge. Learning orientation influences the degree to which an organisation is satisfied with its theory in use and, hence, the degree to which proactive learning occurs" (p309). They identify three organisational values routinely associated with the predisposition of the firm to learn: commitment to learning, open-mindedness, and shared vision (Day, 1991, 1994a; Senge, 1990, 1992; Tobin, 1993). The actual measure of learning orientation is an eleven-item scale, of which four items measure commitment to learning, four items measure shared vision, and three items measure open-mindedness.

- Commitment to learning influences whether an organisation is likely to promote a learning culture. If an organisation places little value on learning, little learning is likely to occur (Sackmann, 1991). This dimension of commitment to learning is related to Senge's (1990) discussion of learning principles – whether the value placed on the learning activity can be viewed as axiomatic, and Tobin's (1993) thinking literacy – whether the ability to think and reason is a value axiomatic to the organisation.

- Open-mindedness is likened to the notion of unlearning (Nystrom and Starbuck, 1984). When organisations proactively question long-held routines, assumptions and beliefs, they are engaging in the first phase of unlearning. Unlearning is at the heart of organisational change, and open-mindedness is an organisational value that may be necessary for unlearning efforts to transpire (Sinkula et al 1997).

- Shared vision influences the direction of learning, whereas commitment and open-mindedness influence the intensity of learning. Shared vision provides the organisation with a focus for learning that fosters energy, commitment, and purpose among organisational members (Day, 1994). Without a shared vision, individuals are less likely to know what organisational expectations are, what outcomes to measure, or what theories are in operation (Sinkula et al 1997).

In contrast, Hult (1998) and Hult et al (2000) relate the conceptualisation of organisational learning in conjunction with the sub-processes of learning and the cognitive levels of learning, i.e. information acquisition, information dissemination, and shared interpretation (Sinkula, 1994; Slater and Narver, 1994, 1995). Hult (1998) and Hult et al (2000) further define organisational learning as a function of two related but different concepts: (1) the process of learning, and (2) the structure of the learning organisation. Hult (1998) designs an organisational learning construct that includes four distinct, yet related, components:

- Team orientation: the degree to which the corporate buying centre and the SBU field manager in the focal sourcing unit stress collaboration and cooperation in performing sourcing activities and in making sourcing decisions.

- Systems orientation: the degree to which the corporate buying centre and the SBU field manager in the focal sourcing unit stress the broad picture of the activities in the strategic sourcing process, and thus a reason certain activities exist.

- Learning orientation: the degree to which the corporate buying centre and the SBU field manager in the focal sourcing unit stress the value of organisational learning for the long-term benefits of the sourcing process and the specific sourcing unit.

- Memory orientation: the degree to which the corporate buying centre and the SBU field manager in the focal sourcing unit stress communication and distribution of sourcing knowledge (Sinkula, 1994).

Sinkula et al (1997) found strong evidence of both convergent and discriminant validity of the scale. Additionally, Hult (1998) and Hult et al's (2000) construct is restricted to a certain type of business environment, whilst Sinkula et al's (1997) can be applied to a wider range of organisational contexts. In view of the above discussions, this research adopts Sinkula et al's (1997) operational definition and measurement construct which consists of 11 items partitioned into three components: commitment to learning, shared vision and open-mindedness.

3.5 INNOVATIVE ORIENTATION

The extant innovation literature does not arrive at any consensus over many issues due to under-specification of innovation and the lack of a holistic construct of its measurement. It is commonly believed that innovation may be present in various forms, such as product or process innovation, radical or incremental innovation, administrative or technological innovation, etc. (Zaltman et al. 1973; Utterback, 1994; Cooper, 1998). This presents a challenge for studies of overall organisational innovativeness. Thus, a prime interest was to investigate innovation activities and their associations, where adoption of one or more innovations are examined as the dependent variable and linked to attributes of the organisation, the individual respondent, and the innovation itself (Gallivan, 2001). The majority of studies briefly introduce a definition of innovation from a particular dimension for use in the specific study, rather than undertake an exploration of the domain. Viewing innovation narrowly as one dimension has led to confusion in innovation research, either making it difficult to compare findings across studies or leading to biased conclusions (Zaltman et al., 1973; Tushman and Anderson, 1986; Utterback, 1994; Subramanian and Nilakanta, 1996; Cooper, 1998). A number of researchers examine organisational innovativeness instead of innovation, attempting to cover the various dimensions of innovation. Measuring innovativeness has advantages over measuring innovation.

- Firstly, innovativeness is represented through certain traits such as newness and novelty etc and can be easily quantified in terms of to what degree or extent that organisations are innovative, rather than simply classifying them as either innovative or not (Rothwell and Zegveld, 1982).

- Secondly, innovativeness, as a trait, can be constructed to cover various key aspects of innovation. It is more likely to build up a multidimensional measurement, which is more reliable for measuring overall innovativeness rather than examining the innovative nature of an organisation through one or two aspects of innovation.

- Finally, innovativeness measures capabilities of an organisation and indicates the propensity of the organisation to introduce new products to the market, or open up new markets. Measuring overall innovativeness is not only about measuring new product developed or new market opportunities, but also prescribes the underlying elements of innovation outcomes, i.e. behavioural innovativeness, process innovativeness, and strategic innovative orientation.

Unfortunately, little literature encompasses the differing notions. This lack of clear and encompassing definitions had led to considerable confusion and contradiction. The following section reviews existing literature on all aspects of organisational innovativeness and identifies components for the operational construct.

3.5.1 Defining Organisational Innovativeness

Organisational innovativeness has been defined from various angles. In this research, we use organisational innovativeness as a synonym of innovative orientation, and define an organisation's innovative orientation as a capability that indicates the propensity of the organisation to introduce new products to the market, or open up new markets, through combining their strategic orientation with innovative behaviour and processes. This is the operational definition of innovative orientation in this research.

At the descriptive level, innovativeness comprises of four prime traits: newness, appropriateness, speediness and voluminousness. The four traits are integral parts of measuring overall organisational innovativeness.

- **Innovativeness trait 1: newness.** This trait is connected to the novelty of innovations. It is perceived newness, originality, uniqueness or radicalness (Henard and Szymanski, 2001). This perceived newness encompasses two perspectives: from the consumer's perspective and the firm's perspective (Atuahene-Gima, 1995; Cooper, 1979; Cooper and de Brentani, 1991; Meyer and Utterback, 1995; Danneels and Kleinschmidt, 2001). The newness can be present in different scales: newness to the industry and among a set of organisations competing in the same market sector; newness to the organisation that adopts the innovation; and newness to a specific product, process or market sector, etc. The newness can be measured along a scale that distinguishes three types of innovative activities: invention, innovation and imitation.

- **Innovativeness trait 2: appropriateness.** The trait of appropriateness is the extent to which a given output is viewed as useful or beneficial to some audience. In another word, appropriateness means meaningfulness. It is the extent to which the product differs from competing alternatives in a way that is meaningful to customers (Andrews and Smith, 1996). Its measurement scale can range from useful to useless, or appropriate to inappropriate. This trait captures the process of commercialisation of new products or services (Schumpeter, 1934), which is given high regard in that commercialisation is the most critical of innovative activities (Hitt et al 1999) and requires important organisational resources, capabilities and systems that ultimately determine the success of failure of a product or services (Dougherty and Hardy, 1996; Glynn, 1996; Dess et al 1997). In fact, Kleinschmidt and Cooper (1991) suggest that the relationship between innovativeness and commercial success is U-shaped, i.e. products that are very high, or very low, in innovativeness are more successful than moderately innovative ones.

- **Innovativeness trait 3: speediness.** Using new ideas to produce new products or services is an important criterion of innovativeness. The speed of bringing innovative ideas into commercialisation differentiates one organisation from another and constitutes the second trait of innovativeness. The distinction of this trait has resulted in categorisation of the potential adopters of innovation into innovators, early adopters, early majority, late majority and laggards (Rogers, 1983). The speed of adoption is an important dimension to capture a firm's readiness and propensity to innovate (Subramanian and Nilakanta, 1996).

- **Innovativeness trait 4: voluminousness.** The time dimension of innovativeness reflects the issue of 'when' the innovation occurs, based on single innovative action. However, this neglects repeated innovative actions. Innovativeness is an enduring trait that is consistently exhibited by innovative firms over a long period (Ashok, 1996), rather than a one-off event. Meanwhile, an organisation that is an early adopter for a specific innovation might be a late adopter or even laggard for another innovation (Mansfield, 1968; Midgley and Dowling, 1978). An organisation that constantly produces innovative outcomes is more innovative than those who occasionally do so. Along this dimension, organisations can be categorised as one-off innovators, occasional innovators, and regular innovators in an ascending order. Innovativeness is an enduring trait – innovative firms will display a consistently high level of innovativeness over time (Subramanian and Nilakanta, 1996). Damanpour and Evan (1990) measure innovativeness by determining changes in the mean number of innovation adoptions over two periods of time.

Clearly, a single dimension of time does not conclude an organisation's innovativeness. Focusing only on the first action can lead to limited insights and erroneous conclusions regarding long-term adoption levels of innovation that rely on repeated innovative actions (Urban, et al., 1987). Therefore, the volumiousness trait is introduced as a salient dimension (Chandrashekaran and Sinha, 1995) to count repeated actions. This trait is also used by other researchers such as Lyon and Ferrier (1998) and Lyon et al (2000) as the number of innovative actions. The above four traits in combination depict the overall innovative nature: innovativeness refers to the notion of 'meaningful uniqueness' that is presented on a timely and a regular basis.

3.5.2 Different Levels of Innovativeness

The conceptualisation of innovativeness has been approached from various levels and perspectives. Existing literature discerns interests at the levels of consumer innovativeness, individual innovativeness, cross-functional team innovativeness and organisational/firm innovativeness.

- **Consumer innovativeness:** Marketing research is primarily interested in understanding the causes of innovative behaviour of consumers. There is a rich literature about consumer innovativeness, such as Ford (1978), Joseph and Vyas (1984), Goldsmith et al. (1995), Chau and Hui (1998), presenting various associates, such as product-category-specific adoption behaviour (Hirschman, 1980; Gatignon and Robertson, 1985; Goldsmith and Flynn, 1995) and lifestyles (Leung, 1998). In general, consumer innovativeness has been conceptualised as the desire or willingness to try new and different experiences (Hirschman, 1980), or a consistent tendency to buy new and innovative products (Bass, 1969).

- **Individual innovativeness:** Individual innovativeness is stressed in literature, in that organisational capabilities are based on harnessing the innovativeness of key individuals and teams to create value (Leavy, 1999). In Rainey's (1999) research, innovativeness of individual employees in public and private organisations is differentiated in terms of innovative attitudes and behaviours, and thus related to willingness or resistance to change. An often quoted framework of measuring individual innovativeness is the Hurt-Joseph-Cook psychometric scale (Hurt et al, 1977).

- **Team innovativeness:** Cross-functional new product teams' innovativeness is measured through a construct that captures innovativeness of the team's product, the number of innovations or new ideas introduced by the team, the team's overall technical performance, and the team's adaptability to changes (Lovelace et al., 2001).

- **Organisational/firm innovativeness:** Literature on organisational/firm innovativeness encompasses the concept from multiple angles. These include technological and behavioural innovativeness (Avlonitis et al, 1994), innate (Midgley and Dowling, 1978; Pallister and Foxall, 1998) or actualised innovativeness (Hirschman, 1980), abilities (Miller and Friesen, 1983) or outcomes (Dosi, 1988), and product/ market /process / services /managerial innovativeness (North and Smallbone, 2000), etc.

The above foci are not exclusive to one another. Organisations function via individual and team actions and behaviour, therefore individual traits need to be considered into team innovativeness, and both individual and team traits must be considered in creating organisational innovativeness. Consumer innovativeness must be considered and reflected in product or market innovativeness. In this sense, organisational innovativeness envelops the individual, team and consumer innovativeness. A holistic organisational innovativeness framework should be able to pick up the effects and nuances of individual, team and consumer parameters.

3.5.3 Dimensions of Organisational Innovativeness

Current literature demonstrates various ways of conceptualising and measuring organisational / firm innovativeness. For example: -

- Schumpeter (1934) stresses the role of innovation as a key distinguishing factor for entrepreneurs and suggests a range of possible innovative alternatives: developing new products or services; developing new methods of production; identifying new markets; discovering new sources of supply; and developing new organisational forms.

- Miller and Friesen (1983) define innovativeness as the ability of a firm to introduce new products and production processes in order to capitalize on marketplace opportunities. They include four dimensions: new product / service innovation; methods of production or rendering of services; risk taking by key executives of the firm in seizing and exploring 'chancy' growth opportunities;

seeking of unusual, novel solutions by senior executives to problems via the use of 'idea men'.

- Capon et al (1992) measure three dimensions of a firm's innovativeness: market innovativeness; strategic tendency to pioneer; and technological sophistication. Deshpande et al (1993) adopted Capon et al (1992) and Capon et al (1988) scales of innovativeness to measure the relationship between innovativeness and performance.

- Avlonitis, et al. (1993, p9) consider that innovativeness denotes "an array of activities in the technological and behavioural sphere of firms". "Organisational innovativeness represents a latent capability of firms, which is composed of two critical parts, a technological and a behavioural one". Through factor analysis of 11 variables, Avlonitis et al (1993) identify five fundamental dimensions of organisational innovativeness: technological innovation challenges; manifested strategic innovation intentions; product innovativeness; innovativeness of core machinery; and innovative leadership.

- Guimaraes and Langley (1994) view overall company innovativeness as 'innovation effectiveness' and thereby measure innovativeness by measuring effectiveness of four components of innovation: seeking new ideas, evaluating new ideas, using new ideas, and fostering innovation. Company effectiveness in performing any of these functions alone provides no guarantee of success in innovating. It is the combination of effectiveness in all these components that leads to higher performance.

- Subramanian and Nilakanta (1996) define innovativeness as an enduring organizational trait. Innovative organisations are those that exhibit innovative behaviour consistently over time. The multi-dimensional construct of organisational innovativeness consists of two types of innovativeness: technical and administrative innovativeness, each having three dimensions: number of innovation adoptions, mean time of innovation adoptions, consistency of time of innovation adoptions. Administrative innovations are those that occur in the administrative component and affect the social system of an organisation, such as rules, roles, procedures, and structures that are related to the communication and exchange between organisational members. These can be a new management system, administrative process, or staff development. Technical innovations are those that occur in the operating component and affect the technical system of an organisation, such as equipment, methods of operations or information into products or services. These can be the adoption of a new idea pertaining to new products or services, or new elements in an organisation's production process or service operations.

- Hurley and Hult (1998, p44) introduce two separate innovation constructs: innovativeness, as a culture; and the capacity to innovate, as an organisational outcome. "Innovativeness is the notion of openness to new ideas as an aspect of a firm's culture." Innovativeness of the culture is a measure of the organization's orientation towards innovation. The capacity to innovate is "the ability of the organisation to adopt or implement new ideas, processes, or products successfully". Innovativeness is measured via five scales: 1. Technological innovation is readily accepted; 2. Management actively seeks innovative ideas; 3. Innovation is readily accepted in management; 4. People are penalised for new ideas that don't work; 5. Innovation is perceived risky and is resisted.

- Rainey (1999) studied innovativeness in terms of innovative attitudes of organisational members. Innovativeness is referred to as the degree of willingness or reluctance to change. Rainey's behavioural dimension includes both employee behaviour and managerial behavioural. For employee behaviour, Rainey adopts Patchen et al's (1965) measurement: what is the outcome when a person tries to change his usual way of doing things and how many times does a person suggest a different or better way of doing things.

- Lyon et al (2000, p1056) refer to innovativeness as "attempt to embrace creativity, experimentation, novelty, technological leadership, and so forth, in both products and processes". Theoretically it is suggested, innovativeness measurement may include the number of innovative actions, and the percentage of scientists and engineers relative to the total number of employees.

- North and Smallbone (2000) adopt the definition of innovativeness as the degree or extent to which the firm is innovative, and innovation as something new to the firm. They emphasis the process perspective of innovation, multidimensional characteristics of innovation, different degrees of innovation, and the importance of the sectoral context. Based on these principles, they measure overall innovativeness by producing an index of total innovative activity, which includes product innovation, market development, marketing innovation, process innovation and use of advanced technology, and application of IT in administration.

Table 3.4 A Summary Of Studies Of Innovativeness

	Product	Market	Process	Behaviour	Strategic
Schumpeter 1934	X	X	X		
Miller & Friesen 1983	X		X	X	X
Capon et al 1992		X			X
Avlonitis et al 1993	X		X	X	X
Subramanian & Nilakanta 1996			X		
Hurley & Hult 1998				X	
Rainey 1999				X	X
Lyon et al 2000	X		X		
North & Smallbone 2000	X	X	X	X	

This is not an exhaustive list of areas covered in multiple dimensions, but an indication that many perspectives need to be considered in constructing an effective measurement of organisational innovativeness, including innovativeness in terms of product, market, process, behaviour and strategic innovation (see Table 3.4). It would be misleading to relate organisational innovativeness with only one single action, i.e. the adoption of one or a small number of technological innovations can not conclude an organisation's innovativeness (Avlonitis, et al., 1993). To reveal the innovative nature of organisations, different dimensions of the concept must be taken into consideration.

3.5.3.1 Product Innovativeness

Product innovativeness is important for several reasons. Innovative products present great opportunities for firms in terms of growth and expansion into new areas. Significant innovations allow firms to establish dominant position in the competitive marketplace, and afford new-comer firms an opportunity to gain a foothold in the market (Danneels and Kleinschmidt, 2001). Product innovativeness (Zirger, 1997) has been a major interest in innovativeness research (Masaaki and Scott, 1995; Schmidt and Calantone, 1998), in that it is a critical antecedent to product success (Zirger, 1997; Sethi et al, 2001), which is highly associated to sustainable success of a business's operations (Henard and Szymanski, 2001).

There is also a propensity in the literature to incorporate various other perspectives of innovativeness in product innovativeness. For example, Song and Parry (1999) include R & D processes; Avlonitis et al (1994) include technological innovativeness, etc. Danneels and Kleinschmidt (2001) incorporate two perspectives of product innovativeness: from the customers' perspective, innovation attributes, adoption risks, and levels of change in established behaviour patterns are regarded as forms of product newness; within the firm's perspective, environmental familiarity and project-firm fit, and technological and marketing aspects are proposed as dimensions of product innovativeness.

Within the existing literature, product innovativeness has been measured using the following variables (for an extensive review of empirical studies of product innovativeness, see Danneels and Kleinschmidt, 2001, p359):

- Avlonitis et al (1994): early adoption of technological innovations and newness of main products.

- Song and Parry (1997b): the innovativeness of a product's technology to the market and the firm, the effect of the product on the industry, and the newness of the product's class and its manufacturing and R & D processes to the firm.
- Sethi et al (2001): the novelty of new products (measured by two variables: predictable/novel, and commonplace/original) and appropriateness of new products (measured by two variables: useful/useless, and appropriate/ inappropriate) (using measurement modified from Andrews and Smith's (1996) marketing program creativity).
- Henard and Szymanski (2001): perceived newness, originality, uniqueness and radicalness of the product.
- Danneels and Kleinschmidt (2001) measure product innovativeness from two perspectives: from the customers' perspective: innovative attributes, adoption risk, and behaviour change; within the firm's perspective: market familiarity, technological familiarity, marketing fit, technological fit, and new marketing activities.
- New product innovativeness should also reflect customer input and incorporate customer specifications into a new product initiative (Sethi et al, 2001; Andrews and Smith, 1996; Henard and Szymanski, 2001).
- Services can be viewed as product extension (North and Smallbone, 2000). Services innovativeness is incorporated in product innovativeness. Service innovativeness is described to have six distinct service innovativeness types - new-to-the-market services, new-to-the-company service, new delivery processes, service modifications, service line extensions, and service repositionings (Avlonitis and Papastathopoulou, 2001).

3.5.3.2 Market Innovativeness

Market innovativeness is highly connected to product innovativeness, and often studied as product-market innovativeness (Schumpeter, 1934; Cole, 1946; Cooper, 1973; Miller, 1983). In fact, Ali et al (1995) consider innovativeness as a market-based construct and define innovativeness to be the uniqueness or novelty of the product to the market. At a broader level, market innovativeness refers to innovation related to market research, advertising and promotion, as well as identification of new market opportunities and entry into new markets.

Market innovativeness has been measured from the following variables:

- Miles and Snow (1978) rank different types of firms to the degree that they favour product/market innovativeness in the descending order: prospectors being the greatest, followed by analysers and the defenders being the least.
- Miller (1987, 1988): the percentage of total sales specifically on the costs of initiating and implementing product-market innovations.
- Capon et al (1988) and Capon et al (1992): the percentage of corporate revenues in the introductory and growth stages of the product life cycle; the percentage of corporate revenues resulting from new technology; and frequency of providing first-to-market products or services.
- Ali et al (1995) define highly innovative products as 'new-to-the-world' products that create an entirely new market (Booz, Allen and Hamilton, 1982) and view innovativeness as market-based .
- Andrews and Smith (1996) adopt the concept of 'creativity of the marketing program' and measure market innovativeness from two dimensions: novelty and meaningfulness. Novelty refers to "the degree of difference between a product's most recent marketing program and the competitors' programs". Meaningfulness refers to "the extent to which the marketing initiatives are thought to be attractive or valuable to the group for which they were devised". The two dimensions are weighted equally and contain 10-item 7-point semantic differential scale.

3.5.3.3 Process Innovativeness:

Process innovativeness refers to introduction of new production methods, new management approaches, and new technology that can be used to improve production and management processes. To be more specific, process innovativeness is addressed by the following authors in the literature (as summarised below):

- Schumpeter (1934): introduction of new methods of production

- Song and Parry (1997b, 1999) and Booz, Allen & Hamilton Inc. (1982): The nature of the manufacturing process was totally new to the company.
- Miller and Friesen (1983): Rate of change in production methods
- Avlonitis et al (1994): Future investments in new methods of production.
- North & Smallbone (2000): Use of computer technology at some stage of provision of core manufacturing or service activity; and process innovation involving computer technology.
- Avlonitis et al. (1994) consider the technological dimension includes the technological history, which is manifested through the products that the organisation manufactures, and the equipment it uses for production, and the capabilities of its exploiting technological innovations. Two fundamental dimensions are identified: technological innovation challenges (measured by three variables: technological innovation challenges in relation to machinery, in relation to production methods, and in relation to raw materials) and innovativeness of core machinery (measured by technological innovation challenges in relation to machinery and updatedness of the main machinery in use).
- Kitchell (1997) considers technological innovativeness is best examined in light of the nature and process of innovation adoption. Her research focuses on the specific area of computer technology adoption and identifies an innovation list consisting of 12 computerised manufacturing applications.
- Capon et al (1992) measure the technological innovativeness using the scale of frequency of companies at the cutting edge of technology.

3.5.3.4 Behavioural Innovativeness

Behavioural innovativeness refers to behaviour that demonstrates innovative orientation, and can be demonstrated through individual innovativeness, team innovativeness and managerial innovativeness. The behavioural dimension should reflect the "sustained behavioural change" of the organisation towards innovations, i.e. behavioural commitment (Avlonitis et al, 1994). However, Avlonitis et al (1994) include managerial behaviour rather than team behaviour.

Research on innovation adoption and diffusion has long converged on a core set of theoretical frameworks that seek to explain target adopter attitudes and their innovation-related behaviour (Gallivan, 2001), including diffusion of innovations (Rogers, 1983), the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the Technology Acceptance Model (Davis, et al, 1989), the Theory of Planned Behaviour (Ajzen, 1985; Taylor & Todd, 1995), and Social Cognitive Theory (Compeau & Higgins, 1995).

- Hurt et al (1977) define innovativeness as "a normally distributed underlying personality construct, which may be interpreted as a willingness to change". The construct is based on a normally distributed, unidimensional characteristic of the individuals who compose a social system (Rogers and Shoemaker, 1971). The categories of individual innovativeness are reminiscent of the behaviour of the adaptive cognitive style described by Kirton (1976): adaptors are relatively controlled, systematic, consistent, steady, reliable, prudent, sensitive, realistic, efficient and orderly; innovators are more extrovert, less dogmatic, more tolerant of ambiguity, radical, flexible, assertive, expedient, undisciplined and sensation seeking.
- Zaichkowsky's (1987) measure of personal involvement assesses product field interest.
- Lovelace et al (2001) study the new product team's innovativeness and include the behavioural dimension using measurement of the team's adaptability to change.
- Rainey (1999) defines innovativeness as the degree of willingness or reluctance to change from both employee behaviour and managerial behaviour. For employee behaviour, Rainey adopts Patchen et al (1965) measurement: what is the outcome when a person tries to change his usual way of doing things and how many times does a person suggest a different or better way of doing things.
- Avlonitis et al (1994) identify innovative leadership (measured by three variables: early adoption of technological innovations; frequency of submission of proposals for the introduction of new technological innovations; and managerial response to the adoption of innovations by main competitors).

- Kirton's (1976) Adaption-Innovation Inventory uses behavioural indicators of adapters and innovators to determine which managers are adaptive or innovative. Kirton's KAI uses three categories to identify each characteristic of the manager: the first one contains traits that identify the creative person such as Rogers' (1959) creative loner; the second one is methodical Weberianism envisaged by Weber (1948); and the third one is the Mertonian Conformist, which is adopted from Merton (1957).
- Hurley (1995) defines innovativeness in terms of cultural innovativeness – internal receptivity to new ideas and innovation. He measures innovativeness from two aspects on "technical innovation based on research results is readily accepted", and "management actively seek innovative ideas". These two aspects are indeed managerial innovativeness.

3.5.3.5 Strategic Innovation

Strategic innovation is "a fundamental reconceptualisation of what the business is all about that, in turn, leads to a dramatically different way of playing the game in an existing business" (Markides, 1998). Strategic innovation takes place when a company identifies gaps in industry positioning, goes after them, and the gaps grow to become the new mass market. These gaps can be:-

- New customer segments emerging, or customer segments that existing competitors neglect;
- New customer needs emerging, or existing customer needs that existing competitors do not serve well;
- New ways of producing, delivering, or distributing existing (or new) products or services to existing (or new) products or services to existing (or new) customer segments.

In a broad sense, Besanko et al (1996) define strategic innovation as the development of new competitive strategies that create value for the firm. There are four components in this concept:-

- The primary activity is to encourage a mismatch between ambitions and existing resources in order to stretch or leverage limited resources creatively. Organisations seek to develop and foster change. The mismatch between ambitions and resources yields effective and productive change.
- The organisation finds that contradiction is necessary for strategic innovation and the resulting higher performance.
- Change is self-generated and results from internal, contradictory forces.
- The organisation manages in the direction of misfit. The culture evolves in a manner that encourages components to interact and influence one another toward misfit.

Markides (1998) identifies four types of obstacles that established players face in relation to strategic innovation:-

- Companies are successful in their existing market, and have no intention to change.
- Companies have already recognised the need to change, but do not know their strategic orientation.
- Companies are hesitant in taking risks due to the uncertainty of change.
- Companies are lack of capabilities of managing change.

At the empirical level, the measurement of strategic innovation is scattered. The majority of authors do not consider strategic innovation as part measurement of organisational innovativeness. Whilst some others include a single item of strategic innovation. For example:-

- Miller and Friesen (1983) view key executives' risk taking in seizing and exploring chancy growth opportunities as an important criterion of organisational innovativeness.
- Capon et al (1992) consider a company's strategic tendency to pioneer as a dimension of organisational innovativeness.

- Avlonitis et al (1993) include manifested strategic innovation intentions in measuring organisational innovativeness.
- Jensen (1988) and Karlsson (1988) focus on the process of decision-making on innovation adoption, rather than the outcome of decision making. They argue that firms with superior information processing capabilities will adopt faster. Jensen (1988) includes two basic conceptual determinants of innovativeness: risk-averse and corporate inertia. Risk-averse reflects attitudes towards uncertainty (Ettlie and Vellenga, 1979). Corporate inertia determines the amount of time required by a firm to reach a decision and to act on it (Gee, 1978). Both are concerned with the decision making process and thus constitute elements of the strategic innovation.

3.5.4 The Construct of Organisational Innovative Orientation

As previously mentioned, the existing innovation literature is inconsistent regarding the impact of covariates on organisational innovativeness (Downs and Mohr, 1976; Gatignon and Robertson, 1989), due to an incomplete conceptualisation of innovativeness (Chandrashekaran and Sinha, 1995), or usage of a unidimensional construct (Ashok, 1996). It is generally argued that studies utilizing composite measures of innovativeness are more effective at capturing innovativeness as traits than those considering the adoption or nonadoption of only one technology (Midgley and Dowling, 1978). The above discussions enlist prime dimensions of innovativeness – product, market, process, behavioural, and strategic innovation, which constitute a holistic innovativeness construct (see Figure 3.2).

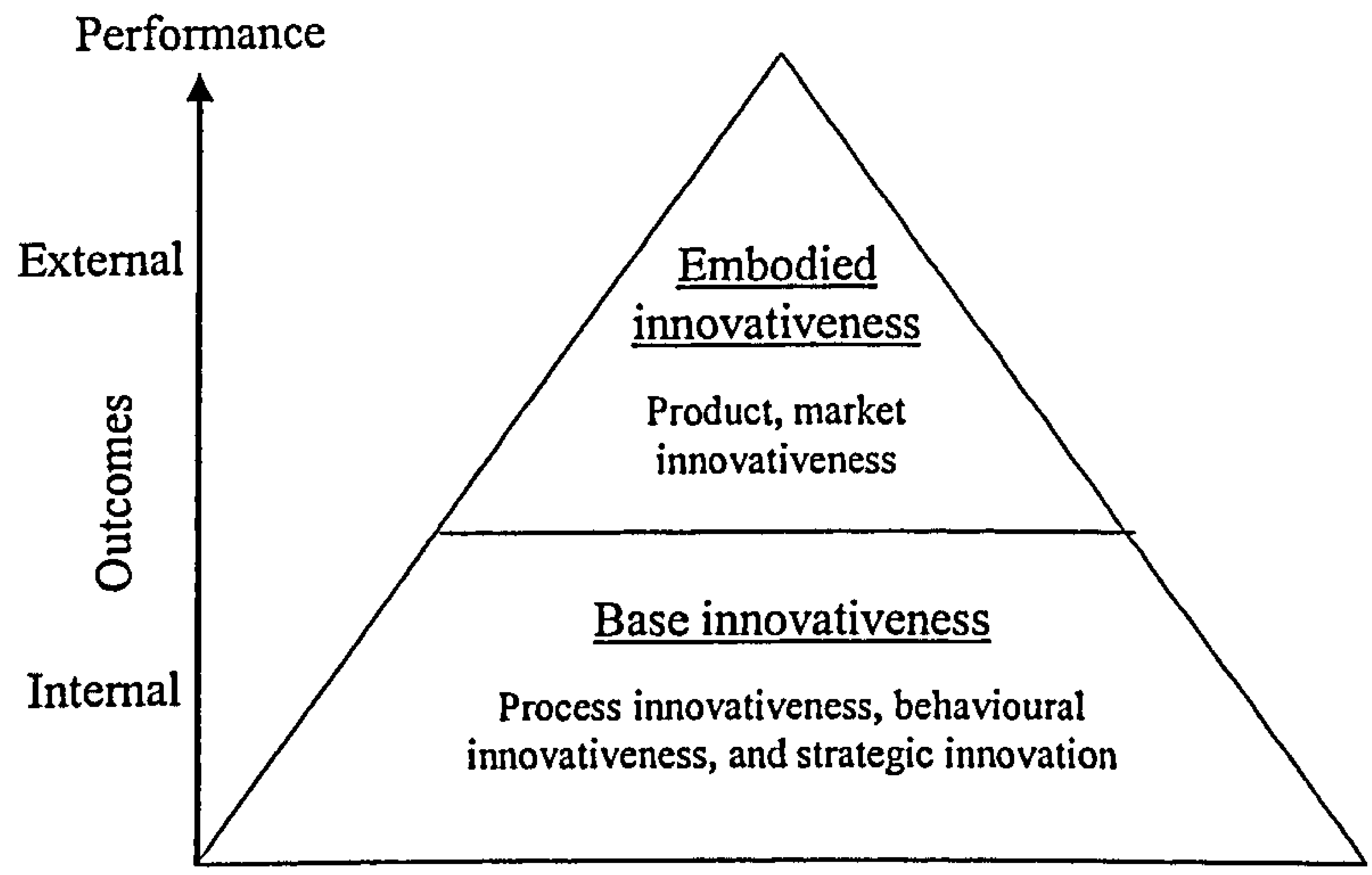


Figure 3.2 The Construct Of Organisational Innovativeness

The five dimensions of innovative orientation can be categorised into two inter-related parts: base innovativeness and embodied innovativeness.

- Base innovativeness is represented by factors of innovation production, which include process, behavioural and strategic innovation. Base innovativeness reflects an organisation's innovative capability: the internal receptivity to new ideas and innovation (Hurley, 1995), or similarly, the ability of a firm to introduce new products and production processes in order to capitalize on marketplace opportunities (Miller and Friesen, 1983). It is a latent capability of organisations and demonstrates the propensity, i.e. the likelihood or tendency that organisations innovate. Organisations possessing stronger innovative capabilities are more likely to produce innovative outcomes.

- Embodied innovativeness is represented by product and market innovativeness. It is outcome-oriented, and indicates the actual innovative output - new product development and new market development, which are closely linked to higher organisational performance. The embodied innovativeness is dependent on the base innovativeness, but the base innovativeness does not necessarily reflect the actual innovations taking place as outcomes, which may be contingent on more variables of capabilities that are unknown at the stage.

This research proposes an organisational innovativeness construct as:

Organisational innovativeness = f (product innovativeness, market innovativeness, process innovativeness, behavioural innovativeness and strategic innovation)

Research on innovation and innovativeness has long been restricted due to the lack of clarified definitions and holistic constructs of measurement. Through a long journey of exploration, researchers have identified various aspects that should be considered in constructing an effective measurement. In this research, a review of key articles in major academic journals was conducted to further refine the conceptualisation of organisational innovativeness. A multidimensional organisational innovativeness construct is proposed to include two main categories: the base innovativeness and the embodied innovativeness, respectively. The base innovativeness encompasses process innovativeness, behavioural innovativeness, and strategic innovation, which together reflect the innovative capabilities of organisations. The embodied innovativeness is reliant on base innovativeness and is outcome-oriented, namely, product innovativeness and market innovativeness. The innovativeness traits of new product development and new market development are particularly emphasised along the dimensions of newness, appropriateness, speediness and voluminousness. The proposed holistic construct incorporates the above five dimensions within two main categories, and captures the prime perspectives of the concept and operationalisation of organisational innovative orientation (see Table 3.5). The validity of this construct will be empirically tested in Chapter 6.

Table 3.5 The Construct Of Organisational Innovativeness

Key Variables	Sources of Scales
Product Innovativeness	
In new product and service introductions, our company is often first-to-market.	Adapted from Capon Farley, Lehmann & Hulbert 1992
Our new products and services are often perceived very novel by customers.	Adapted from Ali et al 1995
In comparison with our competitors, our company has introduced more innovative products and services during the past five years.	Adapted from Subramanian & Nilakanta 1996
In comparison with our competitors, our company is faster in bringing new products or services into the market.	Adapted from Subramanian & Nilakanta 1996
In comparison with our competitors, our company has a lower success rate in new products and services launch.	Adapted from Jackson & Messick 1965; Andrews & Smith 1996; Schumpeter 1934
In comparison with our competitors, we are late in adoption of technological innovations.	Adapted from Avlonitis et al 1994
Market Innovativeness	
Our recent new products and services are only of minor changes from our previous products and services.	Adapted from Danneels & Kleinschmidt 2001
New products and services in our company often take us up against new competitors.	Adapted from Danneels & Kleinschmidt 2001
In comparison with our competitors, our products' most recent marketing program is revolutionary in the market.	Adapted from Andrews & Smith 1996
In new product and service introductions, our company is often at the cutting edge of technology.	Adapted from Avlonitis et al 1994
Our company's most recent new product introduction required a new form of advertising and promotion, different from that used for our existing products.	Adapted from Danneels & Kleinschmidt 2001

Process Innovativeness	
The technology of our main machinery in use is very up-to-date.	Adapted from Avlonitis et al 1994
Our future investments in new machinery and equipment are significant compared to our annual turnover.	Adapted from Avlonitis et al 1994
The nature of the manufacturing process in our company is new compared to that of our main competitors.	Adapted from Song & Perry 1997b, 1999, 2000; Booz, Allen & Hamilton Inc. 1982
We are constantly improving our business processes.	New item
Our company changes production methods at a great speed in comparison with our competitors.	Adapted from Miller and Friesen, 1983
Our future investments in new methods of production are significant compared to our annual turnover.	Adapted from Avlonitis et al 1994
During the past five years, our company has developed many new management approaches.	New item
When we cannot solve a problem using conventional methods, we improvise on new methods.	Adapted from Hurt et al 1997
Behavioural Innovativeness	
We get a lot of support from managers if we want to try new ways of doing things.	Adapted from West & Berman 1997, Rainey 1999
Management is very cautious in adopting innovative ideas.	Adapted from Hurley and Hult 1998
Management actively responds to the adoption of "new ways of doing things" by main competitors.	Adapted from Miller & Friesen 1983
In our company, we tolerate individuals who do things in a different way.	Adapted from Patchen et al 1965, Rainey 1990
We are willing to try new ways of doing things and seek unusual, novel solutions.	Adapted from Miller & Friesen 1983
We encourage people to think and behave in original and novel ways.	Adapted from Hurt et al 1997
Strategic Innovation	
Our firm's R & D or product development resources are not adequate to handle the development need of new products and services.	Adapted from Avlonitis et al 1994
Key executives of the firm are willing to take risks to seize and explore 'chancy' growth opportunities.	Adapted from Miller & Friesen 1983
Senior executives constantly seek unusual, novel solutions to problems via the use of 'idea men'.	Adapted from Miller & Friesen 1983
When we see new ways of doing things, we are last at adopting them.	Adapted from Hurt et al 1997

3.6 CONCLUSIONS

Performance measurement has long been arbitrary in terms of its effectiveness in depicting the real picture of organisational performance. More and more literature focuses on the soft performance indicators, which are viewed as the first-order indicators of performance outcomes. Performance is linked to competitive advantage, which comes from relative superior organisational skills, resources and distinctive capabilities in managing routines and processes. The positional advantage view based on the resourced-based theory recognises that organisations that possess distinctive capabilities and more importantly can transfer these capabilities into competitive advantage in the marketplace have a good chance of winning their competitors and succeed.

Incorporating theoretical propositions based on the classical competitive advantage, the resource-based view, and the positional advantage viewpoint, this research considers knowledge management orientation, market orientation, learning orientation and innovative orientation as distinctive capabilities that organisations should possess in order to create marketplace competitive advantage. These aspects can be viewed as predictors, or antecedents to performance outcomes, and thus can be used as 'soft' indicators of organisational performance. Literature of each of these aspects was reviewed systematically in Chapter 2 and this Chapter. Table 3.6 is a summary of operational definitions and measurement constructs that are to be employed in the later chapters for further empirical analysis.

Table 3.6 A Summary Of Operational Definitions And Measurement Constructs

	Authors	Operational Definition	Measurement Construct
Market Orientation	Kohli and Jaworski (1990); Kohli et al (1993)	"Market orientation is the organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it"	3 components (20 item) • Intelligence generation • Intelligence dissemination • Responsiveness
Learning Orientation	Sinkula et al (1997)	"...learning orientation as giving rise to that set of organisational values that influence the propensity of the firm to create and use knowledge"	3 components (11 items) • Commitment to learning • Shared vision • Open-mindedness
Innovative Orientation	New Scale	Innovativeness measures capabilities of an organisation and indicates the propensity of the organisation to introduce new products to the market, or open up new markets, through combining their strategic orientation with innovative behaviour and processes.	5 components (29 items) • Product innovativeness • Market innovativeness • Behavioural innovativeness • Process innovativeness • Strategic innovation
Knowledge Management Orientation	New Scale	Knowledge management orientation is an organisation's distinctive capabilities of managing the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking.	5 components (30 items) • The knowledge system • Organisational memory • Knowledge sharing • A learning culture • Knowledge benchmarking

Chapter Four

Research Models and Hypotheses Development

* * * * *

4.1 INTRODUCTION

As discussed in Chapter 2 and 3, the knowledge-based view is a recent approach to understanding the relationship between firm capabilities and firm performance (Decarolis and Deeds, 1999). Knowledge is not just a resource alongside other traditional factors of production, but the only meaningful resource (Drucker, 1993), the source of the highest-quality power and the key to the powershift that lies ahead, and will ultimately replace other resources (Toffler, 1990). Indeed, the value of most products and services depends primarily on how knowledge-based intangibles, such as technological know-how, product design, marketing, customer orientation, etc. are developed (Quinn, 1992). Leading management theories have popularised the concept of knowledge as a valuable strategic asset (Brown and Duguid, 1991; Davenport, et al., 1996; Kogut and Zander, 1992; Quinn, et al., 1996; Winter, 1987). Knowledge management is seen to be central to product and process innovation and improvement, to executive decision-making, and to organisational adaptation and renewal (Earl, 2001). However, the intrinsic nature of knowledge management and its impact on performance has not undergone rigorous empirical tests. Cohen and Levinthal (1990) suggest that knowledge management impacts on performance through organisational learning. Authors such as Carneiro (2000) and Nonaka and Takeuchi (1995) consider innovation as the mediator of knowledge management's impact on performance. Whilst Kohli and Jaworski (1990) consider management of knowledge to be highly correlated to market orientation.

The above brief discussion suggests that the impact of knowledge management on performance cannot be examined as a simple and direct effect. The interactions between knowledge management, organisational learning, market orientation and innovation formulate a complex picture of an organisation's capabilities in terms of better performance and attaining competitive advantage. This chapter is based on Chapter 2 and 3, which focus on individual aspects of the concerned concepts. Chapter 2 defines knowledge management orientation as a distinctive organisational capability of managing the knowledge system, organisational memory, knowledge sharing, knowledge-learning culture, and knowledge benchmarking. Chapter 3 critically reviews performance measurement indicators, in particular soft criteria as identified, namely market orientation, learning orientation, and innovative orientation. This chapter elaborates the relationship between these aspects and develops research hypotheses. Because structural equation modelling is used in data analysis, this chapter follows a 2-step procedure and elaborates the development of the measurement models and the structural model respectively. Discussions on structural equation modelling itself are included in Chapter 5: Research Design and Methodology.

4.2 THE MEASUREMENT MODELS

The importance of measurement constructs in achieving the overall validity and reliability of research findings has been addressed by many authors. Research is fraught with controversies, vagaries, and recurrent problems. A main reason is the quality of measurement scales (Flynn and Pearcy, 2001). Jacoby (1978) was one of the first to warn against the use of single items as indicators of complex constructs. Authors such as Churchill (1979), Bagozzi (1984), Peter (1981), and Peter and Churchill (1986) focused on test reliability and validity of measurement scales. The introduction of structural equation modelling provides a holistic method of assessing measurement quality at the same time as theory fit (Bentler and Bonett, 1980; Fornell and Larcker, 1981; Anderson & Gerbing, 1988; Bagozzi and Yi, 1988).

Efforts are made in this research to maximise the validity and reliability of measurement scales from the following angles:-

- Multi-items are used to construct each of the measurement scales;

- The operationalisation of each measurement scale is checked against the relevant content domain for the construct;

- When available and appropriate, existing measurement scales that have been empirically tested are utilised;

- In case of building up new scales, such as knowledge management orientation and innovative orientation, the instrument is built upon previous conceptual and empirical research.

- All measurement scales are subject to confirmatory factor analysis. Confirmatory factor analysis for existing scales, i.e. market orientation and learning orientation, is reported and no further modification will be made on the scale. However, new scales such as knowledge management orientation and innovative orientation are subject to model modifications in order to achieve a goodness-of-fit. The process of modifying the models is reported in Chapter 6: Data Analysis: The Measurement Models.

There are four major constructs in this research (see Table 4.1) As discussed in literature review in Chapter 2 and 3, Kohli et al's (1993) MARKOR is adopted by this research to measure market orientation; Sinkula et al's (1997) scale is adopted to measure learning orientation. The knowledge management orientation scale, the innovative orientation scale and the performance scale are new and efforts have been made to borrow or derive questions from previous studies, as illustrated in Chapter 2 and 3. The following sections give descriptions of the measurements used for independent and dependent variables in this study.

Table 4.1 Sources Of Measurement Scales

Variables	Source of Scales
Market orientation (MARKOR)	Kohli et al (1993)
Learning orientation (LEARNOR)	Sinkula et al (1997)
Knowledge management orientation (KMO)	New Scale
Innovative orientation (INNOVOR)	New Scale
Performance measurement (PERFORM)	New Scale

4.2.1 The Measurement Model of Market Orientation

This research adopts Kohli et al's (1993) conceptualisation of market orientation, i.e. "market orientation is the organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it." Kohli et al (1993) establish a MARKOR construct to measure market orientation. This research adopts the MARKOR scale with very minor wording changes that were made by incorporating the feedback of the pilot questionnaire. For example, "in this business unit" is changed into "in this company". In Question 12 of MARKOR, the word of 'forever' caused confusion and was changed accordingly. Details of all changes can be found in Appendix 4.

The original MARKOR scale consists of 32 items, which are partitioned into three factors: intelligence generation, intelligence dissemination and responsiveness (Jaworski and Kohli, 1993). This original scale was further tested and improved by Kohli et al (1993). Using a single-informant study, they reduced the 32 items into 20 items, with a first order factor structure including a general market orientation factor, and three correlated component factors, namely intelligence generation, intelligence dissemination and responsiveness. The fit statistics for the 32 items (called 'MOD4') were χ^2=710.01, df=429, GFI=0.784, AGFI=0.68, NCP=281.01, TLI=0.81, NFI=0.67, CFI=0.83. The improved 20-item construct through the single-informant study was χ^2=223.55, df=147, GFI=0.875. The 20 item scale was then tested using a two-informant sample, and resulted in MOD25 that was chosen by the Kohli et al (1993), with fit statistics of χ^2=955.21, df=659, GFI=0.681, AGFI=0.575, NCP=296.21, TLI=0.687, NFI=0.497, CFI=0.736. However, instead of a general factor plus three correlated component factors, the factor solution for MOD25 was made up of one general factor, one intelligence generation factor, one combined intelligence dissemination and responsiveness factor, one marketing informant factor, and one non-marketing informant factor.

In this research, the adjusted MOD4, which consisted of 20 items, is considered most appropriate, instead of MOD25, because this research uses a single-informant sample. The adjusted MOD4 demonstrates better fit statistics than the original 32 items. The adopted MARKOR scale is then subject to confirmatory factor analysis. The outcomes are reported in Chapter 6. However, no further modification will be made on the scale.

4.2.2 The Measurement Model of Learning Orientation

As indicated in Chapter 3, this research adopts the concept of 'learning orientation' used by Sinkula et al (1997). As Sinkula et al (1997, p309) note, "one can conceptualise learning orientation as giving rise to that set of organisational values that influence the propensity of the firm to create and use knowledge. Learning orientation influences the degree to which an organisation is satisfied with its theory in use and, hence, the degree to which proactive learning occurs." Three organisational values are associated with the predisposition of the firm to learn: commitment to learning, open-mindedness and shared vision (Day, 1991, 1994; Senge, 1990; Tobin, 1993), which form the core components of the learning orientation construct.

Sinkula et al (1997) did not report the original number of items used to operationalise the construct of learning orientation. However, after item pruning and deletion, the construct consisted of 11 items each of a 5-scale Likert-type scale ranging from strongly agree to strongly disagree. Sinkula et al (1997) used a second-order measurement model, with fit statistics of $\chi^2=51.13$, df=41, CFI=0.99, NFI=0.98. They found strong evidence of both convergent and discriminant validity of the scale. Baker and Sinkula (1999) also found strong evidence of convergent validity of the scale.

In this research, the final 11 items of Sinkula et al's (1997) learning orientation scale is adopted. Confirmatory factor analysis is performed to verify the model fit statistics, which are reported in Chapter 6.

4.2.3 The Measurement Model for KM Orientation

The conceptualisation of knowledge management orientation was elaborated in Chapter 2. Five sub-components of knowledge management orientation were identified. They are the knowledge system, organisational memory, knowledge sharing, a learning culture, and knowledge benchmarking. A new measurement construct of knowledge management orientation is proposed encompassing these five components. Based on the prior conceptual work in Chapter 2, three alternative hypotheses can be specified a priori. The hypotheses testing will be reported in Chapter 6.

H1.1: Though the knowledge management orientation construct is conceptualised as consisting of five distinct components, the covariance among the 30 items can be accounted for by a single factor (i.e. a general knowledge management orientation factor).

H1.2: Covariance among the items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of knowledge management orientation and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H1.3: Responses to each item are reflective of two factors: a general knowledge management orientation factor and a specific component factor corresponding to one of the five conceptual components. Thus, the covariance among the items can be accounted for by a six-factor model.

4.2.4 The Measurement Model of Innovative Orientation

The measurement scale for organisational innovative orientation is a new scale. There is not a construct of organisational innovativeness that is widely accepted for empirical studies. This lack of clear conceptualisation and measurement construct has created confusion and contradiction and makes it difficult to compare research findings. Based on extensive review of literature, this research constructs a new scale, incorporating product innovativeness, market innovativeness, process innovativeness, behavioural innovativeness and strategic innovation as its sub-components. Given the conceptual work elaborated in Chapter 3, the following three hypotheses can be specified. The hypotheses testing results will be reported in Chapter 6.

H2.1: Though the organisational innovativeness construct is conceptualised as consisting of five distinct components, the covariance among the 29 items can be accounted for by a single factor (i.e. a general organisational innovativeness factor).

H2.2: Covariance among the items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of organisational innovativeness and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H2.3: Responses to each item are reflective of two factors: a general organisational innovativeness factor and a specific component factor corresponding to one of the five conceptual components. Thus, the covariance among the items can be accounted for by a six-factor model.

4.2.5 The Measurement for Organisational Performance

As previously discussed, traditional bottomline performance is measured via cost-benefit focus and / or a revenue generation focus (Subramanian and Nilakanta, 1996). As indicated in the literature review in Chapter 3, this research incorporates two levels of performance indicators: the bottomline financial performance criteria, and 'soft' performance indicators, i.e. market orientation, learning orientation, and innovative orientation. The operationalisation of the soft indicators is elaborated above. The bottom line performance outcomes are measured through a two-item scale consisting of return on capital employed and earnings per share.

H3.1: The organisational performance construct consists of two items: return on capital employed and earnings per share.

4.3 THE STRUCTURAL MODEL

The relationships between knowledge management orientation, market orientation, learning orientation and innovative orientation cannot be fully appreciated through direct associations only. Instead, it is the complex interactions between these aspects that lead to better understanding of their impact on organisational performance (Hult and Ketchen, 2001). It is argued by several authors that the impact of knowledge management orientation on organisational performance is mediated by organisational learning (Cohen and Levinthal, 1990), innovation (Carneiro, 2000; Dove, 1999; Nonaka and Takeuchi, 1995), and market orientation (Kohli and Jaworski, 1990; Narver and Slater, 1990). Indeed, knowledge management is important not only to ensure that knowledge is effectively managed but also to ensure that benefits from other resources are appropriated (Nelson and Winter, 1982; Penrose, 1959; Wernerfelt, 1984). As elaborated in Chapter 2, this research systematically reviews literature on knowledge management and identifies its components, which are the knowledge system, knowledge sharing, organisational memory, a learning culture and knowledge benchmarking. Based on this operational construct, the relationships between knowledge management, learning, innovation, market orientation and performance are explored.

4.3.1 Market Orientation:

The relationship between market orientation and performance has been explored by means of a wide range of methodologies, contexts, and measures of market orientation. Research has found a strong relationship between market orientation and performance (Deshpande et al 1993; Jaworski and Kohli, 1993; Narver and Slater, 1990; Ruekert, 1992; Slater and Narver, 1994). At the conceptual level, it is argued that being market oriented, an organisation desires to create superior value for customers, which is a source of sustainable competitive advantage. The improved business performance is also because market orientation provides clarity of focus and vision in an organisation's strategy, generates pride in belonging to an organisation among employees, and results in higher customer satisfaction and loyalty (Narver and Slater, 1990).

At the empirical level, Kohli and Jaworski (1990) find that a market orientation appears to provide a unifying focus for the efforts and projects of individuals and departments within the organisation, thereby leading to superior performance. Similarly, Narver and Slater (1990) find a substantial positive relationship between the magnitude of a business's market orientation and its profitability. Hult and Ketchen (2001) conclude that market orientation has the greatest explanatory power on positional advantage, compared to the other three elements, i.e. innovativeness, entrepreneurship, and organisational learning. Pelham (2000) shows that market orientation has a positive and significant relationship to a range of performance measures, including marketing effectiveness, sales growth, market share, and profitability.

However, many empirical findings from studies of the relationship between market orientation and performance have produced results that are complex and, in several cases, unsupportive. Across many contexts, various studies have found no direct causal relationship between market orientation and objective measures of performance (Han et al 1998). In a two-period study, Narver et al (1999) show that market orientation is significantly related to sales growth but not to corporate return on investment. In several studies of performance outcomes of market orientation in international settings, no effect has been found, indicating a cultural influence on the phenomenon (Bhuian, 1998). Even in one of the founding pieces of work, performance effects vary on the basis of the business context (Narver and Slater, 1990). Additionally, Matsuno and Mentzer (2000) find that the strategy type moderated the relationship between market orientation and economic performance. From these findings, it appears that more work is needed to understand the influence of market orientation on organisational performance.

H 4.1: Market orientation has direct positive impact on organisational performance.

4.3.2 Organisational Learning Orientation:

Research has underpinned the importance of organisational learning in performance. For example, organisational learning is a key to understanding competence development (Drejer, 2000). An organisation can extract lessons from both successes and failures, and generate new insights that have the potential to reshape behaviour (Fiol and Lyles, 1985; Huber, 1991; Sinkula, 1994). It is through behavioural changes that organisational learning leads to better performance (Fiol and Lyles, 1985; Garvin, 1993; Senge, 1990; Sinkula, 1994).

Additionally, a learning culture acts as a buffer between the organisation and the environment that enables the organisation to avoid a reactionary response to every event. Because learning, particularly generative learning, is forward-looking which reduces the frequency and magnitude of major shocks (Day, 1994a,b; Sinkula, 1994). Learning oriented organisations have close and extensive relationships with customers, suppliers, and other key constituencies, and there is a cooperative attitude that facilitates mutual adjustment among them when the unexpected occurs (Webster, 1992). Finally, because of its inherent flexibility, a learning oriented organisation is able to quickly reconfigure its structure and reallocate its resources to focus on the emergent opportunity or threat (Slater and Narver, 1995). Indeed, organisational learning is considered by many scholars as a key to future organisational success and the ability to learning is a priority for organisations to compete effectively in the dynamic marketplace (Lukas et al 1996). DeGeus (1988) and Dickson (1992) suggest that the ability to learn faster than competitors may be the only source of sustainable competitive advantage.

Farrell (2000) found that learning orientation has a significant positive impact on performance, stronger than did a market orientation. This is consistent with Baker and Sinkula (1999) and provides further support that being market-oriented may not be enough and that organisations should aim to be learning-oriented if they are to compete successfully in the long run. Therefore, it is argued that organisational learning may be the only source of competitive advantage (De Geus, 1988; Dickson, 1992; Slater and Narver, 1995), and that organisational learning may be the key to future organisational success (Lukas et al 1996).

H4.2: Learning orientation has direct positive impact on organisational performance.

However, Hult and Ketchen (2001) found that, compared with other capabilities such as market orientation and innovative orientation, learning orientation was less important. Although it does contribute to building and maintaining positional advantage, the impact of learning orientation on performance is better understood in conjunction with other capabilities. Among various studies, learning orientation has often been related to market orientation and innovative orientation.

In terms of the connection of learning orientation to market orientation, Sinkula et al (1997) note that marketing program dynamism (i.e. the frequency with which marketing program modifications are made) may be the most appropriate short-term measure of organisational learning, and conclude that a more positive learning orientation directly results in increased market information generation and dissemination. Learning orientation also has an indirect effect on market information dissemination, a vital market information-processing behaviour that in turn directly affects the degree to which an organisation makes changes in its marketing strategies. Therefore, an organisation's learning orientation mediated by its market information-processing behaviours, affects the propensity to change as exemplified by marketing strategy. Market orientation is indeed a learning process in which organisations learn from all aspects of their environment, including customers and competitors, and take both short and long-term organisational goals into consideration (Kohli and Jaworski, 1990). Market orientation captures organisational learning from the environment, and organisations derive benefits from this learning (Slater and Narver, 1995).

H4.3: Learning orientation has direct positive impact on market orientation.

Baker and Sinkula (1999) further comment that a firm's learning orientation is likely to indirectly affect organisational performance by improving the quality of its market-oriented behaviours. Slater and Narver (1995) comment that competitive advantage and superior performance comes from a combination of three factors: Firstly, an organisation provides superior values to customers when its culture and climate foster behaviours that lead to improvements in effectiveness or efficiency, which, in turn, provide additional benefits or lower prices for customers (Day and Wensley, 1988). Secondly, imperfect imitativeness might be the product of a socially complex organisational environment that is difficult for competitors to understand and emulate (Barney, 1986, 1991). Finally, when an organisational system provides unique insight into opportunities in new or existing markets, it is capable of multiple applications (Hamel and Prahalad, 1994). Thus, organisational learning is valuable to a firm's customers because it focuses on understanding and effectively satisfying their expressed and latent needs through new products, services, and ways of doing business (Day, 1994b; Dickson, 1992; Sinkula, 1994). Businesses that can learn rapidly about their markets and act on that information are positioned best for competitive advantage (Day, 1991; De Geus, 1988; Senge, 1990).

Research on the relationship between learning orientation and market orientation and the impact on performance presents contradictory findings. For example, Slater and Narver (1995) argue that a learning orientation mediates the impact of market orientation on performance. This assumption is based on the differences of conceptualisation of market orientation. In Narver and Slater (1990) and Slater and Narver (1995) market orientation is defined as a form of culture and refers to a specific set of organisational values. Whilst the alternative conceptualisation of market orientation by Kohli and Jaworski (1990) is that market orientation is a set of organisational behaviours that direct toward generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organisation-wide responsiveness to it. The later operational definition is adopted in this research. Therefore market orientation is more of organisational capabilities than a set of norms and culture. An organisation's learning capability can impact on performance when the learning leads to behavioural changes toward delivering better values to its customers.

H4.4: Learning orientation impacts on performance, mediated by market orientation.

4.3.3 Organisational Innovativeness:

The impact of innovation on organisational survival and success has been demonstrated in both industrial practices and academic research (Doyle, 1998; Quinn, 2000). It is argued that innovation is essentially linked to long-term stability, growth, shareholder returns (Cook, 1998), entrepreneurship (Drazin and Schoonhoven, 1996) and business success (Nonaka and Takeuchi, 1995), etc. Since the 1990s, there has been an increasing emphasis on innovation as the main source of competitive advantage (Bolwijn and Kumpe, 1990; Cozijnsen, et al., 2000). Companies must innovate constantly to sustain competitive advantage in the fast changing business world, or risk of being overtaken by competitors (Johne, 1999).

At the empirical level, Hult and Ketchen (2001) found that innovative orientation, in particular "openness to innovation" where cultural values and beliefs of innovativeness are formed and acted upon, is a very important factor in developing a positional advantage. Subramanian and Nilakanta (1996) found that organisational innovativeness improves organisational performance. However each dimension of the two types of innovativeness affects different aspects of organisational performance. The adoption of a large number of technical and administrative innovations leads to greater organisational efficiency, while technical innovations significantly affects an organisation's effectiveness. As mentioned in Chapter 3, the lack of conceptualisation and effective operational constructs is a major problem in identifying the relationship between organisational innovativeness and other organisational parameters. There is a need for further research to adopt a multi-dimensional construct of organisational innovativeness, which is one of the aspects that this research aims to achieve.

H4.5: Organisational innovative orientation has direct positive impact on organisational performance.

It is recognised that an organisation's innovative orientation is linked to learning orientation, because every attempt at developing a new product, a new process and a new market opportunity, is a function of the learning process. Perez-Bustamante (1999) considers innovation as a component of organisational learning, i.e. innovation is a process of acquisition, processing, storage and recovery of information that can be studied from five perspectives: general knowledge creation, R&D learning, manufacturing learning, commercial learning and survival learning. The focus of organisational learning within these approaches does not refer to a linear process of innovation, which is characterised by a continuous flow of information within innovative activities that are either internal or external to the firm. Furthermore, it evokes the simultaneous information gathering and feedback of diverse innovative activities in a chaotic and continuous flux of information and knowledge transmission.

Cohen and Levinthal (1990) address the influence of innovative orientation on learning orientation from the aspect of absorptive capacity. There are two factors that affect a firm's incentives to learning, and therefore, its incentives to invest in absorptive capacity via its R&D expenditures. First, there is the quantity of knowledge to be assimilated and exploited: the more there is the greater the incentive. Second, there is the difficulty (or the ease) of learning. When learning is more difficult, more prior knowledge has to have been accumulated via R&D for effective learning to occur. As a result, this is a more costly learning environment. In such a setting, R&D is more important to building absorptive capacity and the more R&D effort the firm will need to have expended to achieve some level of absorptive capacity. Thus, for a given level of a firm's own R&D, the level of absorptive capacity is diminished in environments in which it is more difficult to learn. In addition, a more difficult learning environment increases the marginal effect of R&D on absorptive capacity. In contrast, in environments in which learning is less demanding, a firm's own R&D has little impact on its absorptive capacity. In the extreme case in which external knowledge can be assimilated without any specialised expertise, a firm's R&D would have no effect on its absorptive capacity.

H4.6: Organisational innovative orientation has direct positive impact on learning orientation.

Hurley and Hult (1998) point out that there are two underlying assumptions in Slater and Narver's (1995) arguments: on one hand, they suggest that market orientation and learning orientation are inherent or inseparable; on the other hand, they indicate that a learning orientation mediates the market orientation-performance linkage. This apparent contradiction can be resolved by incorporating constructs related to innovation into these models. They argue that models of market orientation should focus on innovation (i.e. implementation of new ideas, products, or processes) rather than learning (i.e. development of knowledge and insights) as the primary mechanism for responding to markets. Indeed, innovation has been missed out from many conceptual and empirical models of research on organisational capabilities and performance. For example, Slater and Narver (1995) fail to address innovation in their study of market orientation. Instead of addressing innovation, they suggest that an entrepreneurial culture promotes organisational learning. Hurley and Hult (1998) comment that emphasising innovation rather than entrepreneurship is particularly important in broadening the market orientation paradigm, particularly in the context of non-profit organisations. Because innovation is more concerned with implementing new ideas, while entrepreneurship underlies the idea of new entry, i.e. entering new or established markets with new or existing goods (Lumpkin and Dess, 1996; Schendel, 1990; Slater and Narver, 1995).

Jaworski and Kohli (1993) suggest that market orientation essentially involves doing something new or different in response to market conditions. It may be viewed as a form of innovative behaviour. However, authors often refer to innovation, which is an outcome of market orientation. This tends to lead to arguments that innovation is the consequence of market orientation (Jaworskil and Kohli, 1996), or market orientation is the antecedence to innovation (Hurley and Hult, 1998). This research adopts the concept of innovative orientation, which is a set of organisational capabilities that indicate the propensity of the organisation to introduce new products to the market, or open up new markets, through a combination of its strategic innovation orientation and innovative behaviour and processes. The proposition that is made here is that an organisation's innovativeness serves to improve its market-oriented capability.

H4.7: Organisational innovative orientation has direct positive impact on market orientation.

Being oriented toward markets provides a source of ideas for change and improvement (Hurley and Hult, 1998). Conceivably, the most important manifestation of market orientation may be the success of innovations en route to the success of an organisation (Deshpande et al 1993). However, the issue of whether market orientation facilitates an organisation's innovativeness has not been addressed explicitly in the literature (Han et al, 1998). As previously mentioned, the relationship between market orientation and performance presents mixed results. The inclusion of the innovation construct can contribute to identifying empirical regularities or reconciling irregularities in the supposed market orientation-performance relationship. Therefore, the level of confidence in market orientation would be advanced from a strategic standpoint (Han et al, 1998). Theoretically, an organisation's innovativeness increases the likelihood of developing new products or services aimed at providing better values to customers, as well as innovative behaviour that directs to better responses to market changes. From this conceptual viewpoint, innovative orientation impacts organisational performance mediated by market orientation.

H4.8: Market orientation mediates the impact of innovative orientation on organisational performance.

A learning culture is related to higher levels of organisational innovativeness (Hurley and Hult, 1998). Firms that have enhanced learning orientation are more willing to question long-held assumptions about their fundamental operating philosophies (Senge, 1990; Slater and Narver, 1995). Firms with a strong learning orientation may question the logic of a purely market-oriented approach to new product development. The nature of competition suggests that no replicable strategy will allow business to earn long-run supranormal profits. This indicates that firms with strong learning orientations should not be satisfied with their market orientation, because breakthrough innovations do not always come from reacting to the market as it is. In fact, innovation sometimes requires a vision to predict what the market may become. Firms possessing market oriented capabilities are not necessarily winners in the long-term. A strong learning orientation that leads to generative learning is critical to innovation. An organisation's innovative orientation combined with a strong learning orientation leads to better performance (Baker and Sinkula, 1999).

Indeed, an overlapping conceptualisation of organisational learning and innovation is found in several research studies. Thompson (1965, 036) defined innovation as the "generation, acceptance and implementation of new ideas, processes, products or services". Similarly, Zaltman et al (1973, P2) defined innovation as "an idea, practice or material artifact perceived as new by the relevant unit of adoption". Most recently, Amabile et al (1996, p25) define innovation as "the successful implementation of creative ideas with an organisation".

Furthermore, learning orientation goes beyond a marketplace focus. Learning orientation is a set of values that influences the degree to which an organisation is satisfied with theories in use (Argyris and Schon, 1978), mental models (de Geus, 1988), and dominant logics (Bettis and Prahalad, 1995), which may or may not have their bases in the marketplace. Firms with strong learning orientations encourage employees to constantly question the organisational norms that guide their market-oriented activities and organisational actions (Day, 1991; Garvin, 1993; Sinkula, 1994; Sinkula et al 1997). Learning orientation affects the degree to which organisational members are encouraged to 'think outside the box'. This is when the higher order learning occurs (Slater and Narver, 1995), which is beyond market orientation.

Market-driven business is well positioned to anticipate the developing needs of customers and to respond to them through the addition of innovative products and services. This ability gives the market-driven business an advantage in the speed and effectiveness of its response to opportunities and threats (Slater and Narver, 1995)

H4.9: Learning orientation mediates the impact of innovative orientation on market orientation.

Slater and Narver (1995) assume that market orientation and learning orientation are inseparable. They argue that market-oriented organisations provide the culture framework from which a learning orientation can develop. Because of its external focus, marketing is well positioned to appreciate the benefits of market-driven learning and be the lead advocate of the market-oriented, entrepreneurial values that constitute the culture of the learning organisation. This leads to the following interest in combining market orientation and learning orientation as the mediator of the relationship between innovative orientation and organisational performance. Baker and Sinkula (1999) argue that market orientation facilitates adaptive learning, which in turn facilitates incremental innovation. Firms with a strong market orientation are likely to engage in aggressive product development regardless of their learning orientation. Additionally, firms with high market orientation, but lower learning orientation may be more likely to engage in incremental rather than radical innovations, and emphasise product-line extensions for its current customers, rather than pursue a deep understanding of the latent needs of current and new customers.

Learning orientation is essential, in that a strong learning-oriented organisation focuses on generative learning, which is linked to innovative breakthroughs or radical innovations. However, Baker and Sinkula (1999) further comment that a learning orientation can lead an organisation astray, if a strong market orientation is not present to provide grounding. Market orientation is concerned with knowledge producing behaviours, whilst a learning orientation is concerned with knowledge questioning values.

H4.10: The impact of innovative orientation on organisational performance is mediated by a combination of market orientation and learning orientation.

4.3.4 Knowledge Management Orientation

The rise of knowledge management research is a relatively new phenomenon since 1990s. Efforts have been made to identify, define and categorise knowledge, intellectual capital and knowledge management. In spite of some relatively recent attempts at measuring knowledge management performance, the majority of research fails to provide insights of understanding the intricacy of knowledge management performance. Bontis (2001) conducts a review of knowledge management performance measurement models. A few problems are identified regarding the existing models. Firstly, major models place emphasis on intellectual capital and segregate knowledge into several artificial categorises. Secondly, many models have similar constructs and measures that are merely labelled differently. For example Bontis (2001) notes that human capital (Skandia Navigator) is also called human-centred assets (Technology Brokers) and competence of personnel (Intangible Asset Monitor). Thirdly, most of the existing models are used in case-based reviews, which are primarily of anecdotal nature. Little research has been done in a manner of generalisable findings. A most recent survey conducted by Darroch and McNaughton (2002) studies knowledge management and innovation in New Zealand firms. The authors design a knowledge management scale based on market orientation and essentially consisting of knowledge generation, knowledge dissemination and responsiveness to knowledge. This scale is considered to have serious overlapping with the market orientation scale and restraints further research between market orientation and knowledge management orientation.

Indeed, there is little empirical research that makes an explicit connection between knowledge management and performance. The majority of research takes for granted, from the theoretical viewpoint, that successful firms have and utilise more and better knowledge than others. Some other research is empirical, but is based on one or a few case studies that cannot be used to generalise the understanding of knowledge management performance.

At the theoretical level, the knowledge-based view is an extension of the resource-based view and identifies the primary rationale for the firm as the creation and application of knowledge (Demsetz, 1991; Nonaka, 1994; Spender, 1994; Grant, 1996a). Performance differences between firms are a result of their different knowledge bases and differing capabilities in developing and deploying knowledge (Bierly and Chakrabarti, 1996). As Spender (1996, p59) notes "it is the performance, especially in the face of unanticipated uncertainties and challenges, that is the true test of executive knowledge". Knowledge management can be considered the pre-eminent dynamic capability of the firm and the principle driver of all other competencies and capabilities (Lei et al 1996).

H4.11: Knowledge management orientation has direct positive impact on organisational performance.

As previously mentioned, knowledge management and market orientation are considered as highly correlated concepts, particularly in Darroch and McNaughton's (2002) research. However, there is lack of empirical evidence that supports this relationship. From the conceptual viewpoint, market orientation exists on a continuum characterised by the degree to which firms acquire, disseminate, and respond to information gleaned from customers, channels, and competitors (Jaworski and Kohli, 1993; Kohli and Jaworski, 1990; Kohli et al 1993). Sound market information processing interpretative and memory functions are regarded as essential for creating a superior market orientation (Day, 1994a; Slater and Narver, 1995). The success of these functions depends on the often tacit decision rules for selecting or rejecting information, the mental models used to transform information into knowledge, and the prevailing assumptions about how customers and competitors react to actions taken by the firm in response to new information (Day, 1994a). Kohli and Jaworski (1990) and Narver and Slater (1990) emphasize that acquiring knowledge about customers and competitors and sharing this information between functional areas within a firm are key dimensions of a market-orientation.

It is apparent that market orientation is highly associated to knowledge management orientation. However, what is not clear from the above discussion is the exact relationship between a market orientation and a knowledge management orientation. A knowledge management orientated firm could collect knowledge about market and non-market factors such as knowledge about some new technology for which it has no use in the markets it currently serves, knowledge from employees about their attitudes toward the organisational culture, or knowledge about internal financial issues. In this case, a market-orientation is a sub-set of a knowledge management orientation. However, the constructs could be slightly overlapping in which case a firm could be knowledge management oriented but not emphasise the management of knowledge about the market (Darroch and McNaughton, 2002).

H4.12: Knowledge management orientation has direct positive impact on market orientation.

Currently there is little empirical research, which studies the particular relationship between knowledge management orientation, market orientation and performance. At the theoretical level, an organisation's knowledge management capability needs to contribute to market-orientated activities that allow the organisation to compete in a stronger position to satisfy the needs of their customers (Narver and Slater, 1990).

Li and Calantone (1998) propose a new concept of 'market knowledge competence' reflecting market-oriented knowledge management capability. They define market knowledge as "organised and structured information about the market", and market knowledge competence as "the processes that generate and integrate market knowledge" (p14). Furthermore, the market knowledge competence should focus on three aspects: (1) customer information acquisition, interpretation, and integration; (2) the inter-coordination of marketing and R&D functions; and (3) competitor information acquisition, interpretation and integration. These three aspects impact on new product advantage, which in turn leads to an organisation's market performance. Generically speaking, market knowledge competence, when harnessed, may yield competence advantage (Hunt and Morgan, 1995).

H4.13: Knowledge management orientation has positive impact on organisational performance mediated by market orientation.

Cohen and Levinthal (1990) provide an important link between learning capability and knowledge creation. Accumulated prior knowledge increases the ability to accrue more knowledge and learn subsequent concepts more easily. Learning orientation affects the information that it attends to, interprets, evaluates, and ultimately accepts or rejects (Argyris and Schon, 1978; Dixon, 1992; Hedberg, 1981). Learning orientation influences the propensity of the firm to create and use all kinds of knowledge, not just market-based knowledge. More important, it influences the degree to which firms are likely to promote generative learning as a core competency (Sinkula et al. 1997). However, this is not empirically evidenced in existing literature.

Learning promotes behavioural changes, which may occur in three ways: Firstly, action-oriented use is the direct application of knowledge to solve a problem; Secondly, knowledge-enhancing use influences managerial perspectives on problems, and through organisational memory, provides foundation for revolutionary behaviour change; Thirdly, affective use increases satisfaction or decreases dissonance with a change that already has been made. The three types of knowledge-use form a continuum, from direct to indirect, of the effects of organisational learning on behaviour change (Menon and Varadarajan, 1992).

H4.14: Knowledge management orientation has direct positive impact on learning orientation.

Cohen and Levinthal (1990) further suggest that learning influences the impact of knowledge management on performance. Companies must leverage their existing knowledge and create new knowledge that favourably positions them in their chosen markets to compete effectively. Whilst in order to accomplish this, companies must develop an 'absorptive capability', i.e. the ability to use prior knowledge to recognise the value of new information, assimilate it, and apply it to create new knowledge and capabilities.

Organisational learning occurs by detecting a mismatch of outcome to expectation (Baker and Sinkula, 1999). When a mismatch exists, an organisation utilises existing knowledge to correct errors. If the correction does not involve a change to the organisational norms that guide behaviour, single-loop or adaptive learning is said to occur. If the correction leads to a change in organisational norms and if the learning results from proactive organisational behaviour not in direct response to environmental events, the learning is said to be double-loop or generative (Argyris and Schon, 1978; Bateson, 1972, Sinkula, 1994). These arguments reveal that it is through organisational learning that knowledge is utilised to fill in the performance gap.

H4.15: Knowledge management orientation has positive impact on organisational performance mediated by learning orientation.

Deshpande and Webster (1989) suggest that organisational knowledge systems with shared cognitions represent a metaphorical view of organisational culture that warrants the attention of marketing scholars. They propose that a focus on organisations as cognitive entities, encompassing the concept of organisational memory, could prove to be an interesting way of understanding marketing knowledge development. Part of an organisation's market information processing requires search routines that will yield higher levels of knowledge. Once minor tasks can be replicated, managerial attention can shift to higher levels of abstraction (Jelinek, 1979). Therefore, development of organisational memory will demand more unique and meaningful information in its quest to make sense of its markets. Market research information that contradicts existing routines would promote the most learning because such information leads to greater change (Siegler, 1983). Whilst information that contradicts routines requires more interpretations (Huber, 1991). Sinkula (1994) argues that organisational learning that is directed toward markets is different from other types of organisational learning. The market-based learning is a core competency pertaining to external foci and it is less visible than most internally focused organisational learning competencies, such as organisational work processes. The organisational learning rooted in internal foci is too limited, because internally oriented competencies cannot be productively harnessed unless the organisation has an equally well-honed ability to learn about its markets and diffuse the knowledge widely. In this sense, market-based learning represents the genesis of internally focused organisational learning (Day, 1991, p3).

H4.16: Organisational learning orientation mediates the impact of knowledge management orientation on market orientation.

Knowledge management is often cited as an antecedent to innovation (Carneiro, 2000; Dove, 1999; Nonaka and Takeuchi, 1995). More specifically, knowledge dissemination and responsiveness to knowledge have been considered as having the most important impact on innovation due to the ambiguous and unique nature of the innovation process (Fahey and Prusak, 1998; Grant, 1996a; Teece, 1998). Nonaka and Takeuchi (1995) explain that knowledge is created when individual's tacit knowledge is transformed into collective and explicit knowledge through a spiral of four interactive activities: socialisation, externalisation, combination and internalisation. This is a typified innovation process from the knowledge-based view. Authors such as Perez-Bustamante (1999) suggests that the innovation process can be seen as a flux of knowledge and an iterative process of knowledge transfer.

Managing knowledge demands for a flow rather than a stock perspective. This perspective considers knowledge flows as in constant flux and change, that are created on a day to day basis, connecting, binding and involving individuals who, in turn, transmit, develop and lever new knowledge bases (Fahey and Prusak, 1998). Innovation processes may originate as a reactive defensive answer to novel market, technological or operational conditions, or as a proactive offensive action that may provoke opportunities within the economic, commercial or technical environment of the firm. Defensive innovations take into account information about the competitive situation and the market demand, while offensive innovations exploit information about scientific and technical advances in order to reach a favourable position in the market. Radical innovations are the product of putting together unlikely bits of information in an irregular, serendipitous process, which is not encouraged by bureaucratic and non-agile organisations (Macdonald, 1992). Radical innovations, which tend to be offensive, generate new products or processes that break down the traditional functioning of the market and create an upheaval among competitors, who will try to incorporate as soon as possible the new technological concepts to their production processes inducing changes in their own market and organisations. Incremental innovations arise from the adjustments to the production or commercialisation processes and are less dramatic in their implementation because they are usually developed step by step within the organisation. However, when incremental innovations remain secret, due to the competitors' lack of a cognitive critical mass to understand the continuous flux of improvements, which form part of them, they may be considered radical innovations or a flux of extraordinary changes. Either incremental or radical in their nature, technological advances are among the most important factors that contribute to environmental dynamism and change and thus, they demand for a special forecasting, information gathering and assembling capability.

H4.17: Knowledge management orientation has direct positive impact on innovative orientation.

Innovation is recognised as an imperative in organisational performance outcomes. Indeed, it is argued by some researchers that it is the orientation to innovation and the capacity to implement innovations that determine whether an organisation's capabilities such as market and learning orientations may lead to the development of the organisation and the achievement of superior performance (Hurley and Hult, 1998). Organisations with greater capacity to innovate are more likely to be successful in responding to environmental changes, refining current knowledge base, and reinventing new knowledge in a creative manner and utilising new knowledge in delivering new customer value, typically in the form of new product and services development.

H4.18: Knowledge management orientation has positive impact on organisational performance mediated by innovative orientation.

4.3.5 Summary of Hypotheses

The above discussions elaborate the development of research hypotheses, which can be viewed from the following diagram (Figure 4.1). In order to study the interaction between knowledge management orientation, market orientation, learning orientation, innovative orientation and performance, this research incorporates both direct and indirect relationships between these aspects. The overall conceptual assumptions are an organisation with strong knowledge management orientation is more likely to be market-oriented, learning oriented and innovative oriented. Market orientation and learning orientation mediate the impact of knowledge management orientation and innovative orientation on performance respective. An organisation, which attains better or even superior performance, is an outcome based on its overall capabilities demonstrated through knowledge management, market orientation, organisational learning and innovativeness.

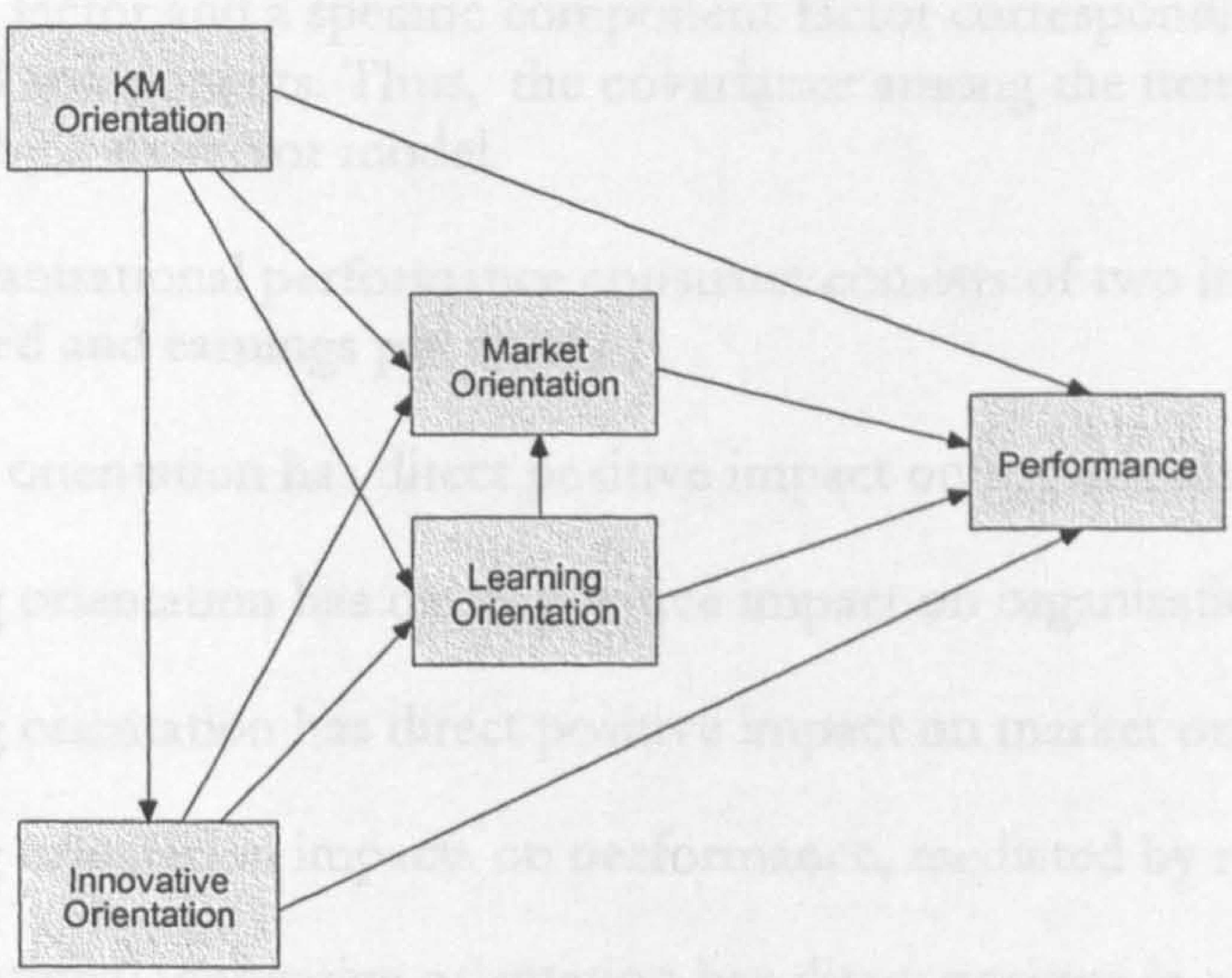


Figure 4.1 The KMO Performance Model

In summary, the following hypotheses are developed and will be further tested and analysed in the later chapters.

H1.1: Though the knowledge management orientation construct is conceptualised as consisting of five distinct components, the covariance among the 30 items can be accounted for by a single factor (i.e. a general knowledge management orientation factor).

H1.2: Covariance among the items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of knowledge management orientation and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H1.3: Responses to each item are reflective of two factors: a general knowledge management orientation factor and a specific component factor corresponding to one of the five conceptual components. Thus the covariance among the items can be accounted for by a six-factor model.

H2.1: Though the organisational innovativeness construct is conceptualised as consisting of five distinct components, the covariance among the 29 items can be accounted for by a single factor (i.e. a general organisational innovativeness factor).

H2.2: Covariance among the items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of organisational innovativeness and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H2.3: Responses to each item are reflective of two factors: a general organisational innovativeness factor and a specific component factor corresponding to one of the five conceptual components. Thus, the covariance among the items can be accounted for by a six-factor model.

H3.1: The organisational performance construct consists of two items: return on capital employed and earnings per share.

H 4.1: Market orientation has direct positive impact on organisational performance.

H4.2: Learning orientation has direct positive impact on organisational performance.

H4.3: Learning orientation has direct positive impact on market orientation.

H4.4: Learning orientation impacts on performance, mediated by market orientation.

H4.5: Organisational innovative orientation has direct positive impact on organisational performance.

H4.6: Organisational innovative orientation has direct positive impact on learning orientation.

H4.7: Organisational innovative orientation has direct positive impact on market orientation.

H4.8: Market orientation mediates the impact of innovative orientation on organisational performance.

H4.9: Learning orientation mediates the impact of innovative orientation on market orientation.

H4.10: The impact of innovative orientation on organisational performance is mediated by a combination of market orientation and learning orientation.

H4.11: Knowledge management orientation has direct positive impact on organisational performance.

H4.12: Knowledge management orientation has direct positive impact on market orientation.

H4.13: Knowledge management orientation has positive impact on organisational performance mediated by market orientation.

H4.14: Knowledge management orientation has direct positive impact on learning orientation.

H4.15: Knowledge management orientation has positive impact on organisational performance mediated by learning orientation.

H4.16: Organisational learning orientation mediates the impact of knowledge management orientation on market orientation.

H4.17: Knowledge management orientation has direct positive impact on innovative orientation.

H4.18: Knowledge management orientation has positive impact on organisational performance mediated by innovative orientation.

4.4 CONCLUSIONS

This chapter develops research hypotheses by exploring the relationship between knowledge management orientation, market orientation, innovative orientation, learning orientation and organisational performance. Existing research in these named areas has laid down the foundation for this research and the basis for cross comparisons. However, existing research does present some contradictory findings that require further research and clarification. This has been discussed in detail throughout this chapter. Additionally, the relationships between knowledge management orientation and the other perspectives of organisational capabilities, namely market orientation, innovative orientation, and learning orientation are under researched, resulting in the ambiguity of knowledge management's impact on performance outcomes. Discovering these relationships and establishing the influential role of knowledge management in organisational practices is the major concern of this research.

Chapter Five

Research Design and Methodology

* * * * *

5.1 INTRODUCTION

This chapter reviews choices of research design and methodology and their strengths and weaknesses respectively. Considering the nature of this research which aims to identify causal relationships between variables, the research design and methodology employed in this research is primarily quantitative, in particular structural equation modeling. Data analysis is conducted using SPSS 10 or AMOS 4.0. Because quantitative research is theory-driven and conducted in a deductive manner, it is imperative that the research constructs, models and hypotheses are based on strong conceptual and theoretical foundations. For this requirement, extensive literature on all theoretical dimensions in relation to this particular research has been conducted and reported in Chapter 2, 3, and 4.

This chapter reports research design and methodology chosen for undertaking the empirical stage of this research, together with sampling procedure, data collection methods, survey instrument development, and questionnaire administration. The reliability and validity of research design is also discussed from the qualitative perspective. Chapter 6 the Measurement Models and Chapter 7 the Structural Model report the reliability and validity on statistical and empirical basis.

5.2 RESEARCH DESIGN

Yin (1989, p28) defines research design as "the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions. Colloquially, a research design is an action plan for getting from here to there, where 'here' may be defined as the initial sets of question to be answered, and 'there' is some set of conclusions (answers) about these questions. Between 'here' and 'there' may be found a number of major steps, including the collection and analysis of relevant data."

Research design is the core of the whole research activity. It outlines the overall structure and orientation of the concerned study, presenting a logical proof to draw inferences regarding causal relations among variables under investigation (Nachimas and Nachimas, 1981, p75). Research design is aimed to attain "precision, logictightness and efficient use of resources" (Oppenheim, 1992), and involves selection of research methods, sampling, data collection, analysis and interpretation (Wright and Crimp, 2000; Nachmias and Nachmias, 1981). An effective research design should be "a comprehensive plan, developed after intensive study of the problem to be researched, that will guide and control the entire research program" (Chisnall, 2001, p34).

The most prominent challenge to research design is its validity and reliability. Yin (1989) discusses four basic tests to evaluate the quality of research design, namely construct validity, internal validity, external validity and reliability. Anderson and Gerbing (1988), Churchill (1995) and Trochim (2000) consider four types of validity: face validity, content validity, construct validity, and nomological validity. Mehrens and Lehmann (1984) elaborate reliability from the perspectives of stability, equivalence, internal consistency, inter-judge reliability, and intra-judge reliability.

The most widely used research design in the field of social sciences are non-experimental research, where the researcher is not in a position to interfere with or manipulate the natural setting of the organisation (Hill, 1993). There are generally three main categories of non-experimental research design, namely survey research, qualitative research, and case study research.

Before discussion of the research design of this thesis, there are two concepts to be clarified: research paradigms, and research methods. Research paradigms include qualitative paradigm, where the researcher uses an inductive, emerging qualitative stance in a study, and quantitative paradigm, where the researcher conducts a deductive, theory-driven study. Research methods refer to data collection techniques. Qualitative methods are such data collection techniques as observations and interviews, whilst quantitative methods are such data collection techniques as surveys and experiments.

5.2.1 Research Paradigms

The quantitative paradigm is termed the traditional, the positivist, the experimental, or the empiricist paradigm established by such authors as Comte, Mill, Durkheim, Newton, and Locke (Smith, 1983). The qualitative paradigm is termed the constructivist approach or naturalistic (Lincoln & Guba, 1985), the interpretative approach (Smith, 1983), or the postpositivist or postmodern perspective. It began as a countermovement to the positivist tradition in the late 19th century through works of Dilthey, Weber, and Kant (Smith, 1983).

5.2.1.1 Qualitative Research Paradigm

Creswell (1998, p15) defines "qualitative research is an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting." Qualitative research emphasises the social and cultural contexts of the study, and provides opportunities for the researcher to be very close to the objects or persons studied, which facilitates an insightful understanding of the research subject. Denzin & Lincoln (1994) elaborate the nature of qualitative research in terms of "the socially constructed nature of reality", "the intimate relationship between the researcher and what is studied" and "the situational constraints that shape inquiry". Qualitative data consist of "detailed descriptions of events, situations and interactions between people and things providing depth and detail" (Patton, 1980). They are rich and holistic, with strong potential for revealing complexity and theory development from qualitative data through rigorous coding and interpretative procedures (Van Maanen, 1983; Miles and Huberman, 1984).

Miles and Huberman (1984) list some distinct strength of qualitative data over quantitative data:-

- They focus on natural occurring, ordinary events in natural setting, so that one can have a strong handle on what 'real life' is like.
- The data have local groundedness, the fact that the data were collected in close proximity to a specific situation, rather than through the mail or over the phone. This emphasis is on a specific case, a focused and bounded phenomenon embedded in its context. The possibility for understanding latent, underlying, or non-obvious issues is strong.

- Qualitative data are rich and holistic, with strong potential for revealing complexity.
- The data are typically collected over a sustained period and, as such, enable them to be used for studying any process; they can even be used to assess causality as it actually plays out in a particular setting.
- Qualitative data have often been advocated as the best strategy for developing and testing hypotheses, and they are especially useful when one needs to supplement, validate, explain, illuminate, or reinterpret quantitative data gathered from the setting.

There are five different qualitative studies: biographical study, phenomenological study, grounded theory study, ethnography, and case study.

- A biographical study is "studied use and collection of life documents that describe turning point moments in an individual's life" (Denzin, 1989b, p69).
- A phenomenological study "describes the meaning of the lived experiences for several individuals about a concept or the phenomenon" (Creswell, 1998, p51).
- A grounded theory study is "to generate or discover a theory, an abstract analytical schema of a phenomenon, that relates to a particular situation" (Creswell, 1998, p56).
- An ethnography is a description and interpretation of a cultural or social group or system. The researcher examines the group's observable and learned patterns of behaviour, customs and ways of life (Harris, 1968).
- A case study is "an exploration of a 'bounded system' or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context" (Creswell, 1998, p61).

Despite its strength, qualitative research does have its weaknesses. Some of the difficulties in the practice of qualitative research include: access problem of interpretation (Bryman, 1988), and the problem of data analysis (Miles and Huberman, 1984). Qualitative data are symbolic in nature, and in need of a meaningful interpretation and response (Patton, 1980). Lack of appropriate data analysis and interpretation is likely to support the generic suspicion about the legitimation of qualitative research, in terms of its validity, reliability and generalisability. This, combined with the other issue of its representational crisis (Denzin & Lincoln, 1994, p11), leads to a serious re-evaluation of its effectiveness. Nevertheless, there is no doubt that qualitative research takes the researcher into a specific context to investigate a deeper perspective of the study, and produces insights about a specific case or issue, which cannot be revealed by quantitative analysis.

5.2.1.2 Quantitative Research Paradigm

Addressing the same issue from a different way, quantitative research emphasises amount, intensity, quantity, and frequency etc., and the measurement and analysis of causal relationships (difference or correlations) between variables. There is a general understanding that quantitative research does contribute to more validated, reliable and generalisable research findings subject to effective sampling, testing, and validating processes.

Quantitative research has several strengths over qualitative research:-

- Quantitative research is often highly preoccupied with establishing the causal relationships between concepts. Babbie (1979, p423) observed that "one of the chief goals of the scientist, social or other, is to explain why things are the way they are. Typically, we do that by specifying the causes for the way things are: some things are caused by other things."
- In quantitative research, researchers are concerned to establish that the results of a particular investigation can be generalised beyond the confines of the research location. By verifying generality, the quantitative researcher draws nearer to the law-like findings of the sciences. For this reason, qualitative research, which is frequently based on the study of one or two single cases, is often disparaged for the cases may be unrepresentative and therefore of unknown generality (Bryman, 1996, p35).
- The replication of established findings is often taken to be a characteristic of quantitative research. Replication can provide a means of checking the extent to

which findings are applicable to other contexts. Additionally, it is often seen as a means of checking the biases of the investigator (Kidder and Judd, 1986, p26).

Survey research is the most widely used quantitative approach in the social science field. A survey research's capacity for generating quantifiable data on large numbers of people who are known to be representative of a wider population in order to test theories or hypotheses has been viewed by many as a means of capturing many of the ingredients of a science (Bryman, 1996). There are some other approaches, such as experiment, analysis of previously collected data, structured observation, and content analysis (Bryman, 1996).

- Experimental design involves at least two groups to which subjects have been randomly allocated: an experimental and a control group. The experimental group is exposed to an experimental stimulus (the independent variable) while the control group is not. Observed differences are reported between the two groups.
- Analysis of previously collected data involves usage of official statistics, such as crime, suicide, unemployment, health, economy, etc.
- Structured observation is the method whereby the researcher records observations in accordance with a pre-determined schedule and quantifies the resulting data, displays many of the characteristics of quantitative research.
- Content analysis is the quantitative analysis of the communication content of media such a newspaper (Beardsworth, 1980).

Miles and Huberman (1984, p20) comment on this subject "the paradigms for conducting social research have shifted beneath our feet, and most people now see the world with more ecumenical eyes". The quantitative paradigm, with a strong positivist vision, is embracing the "naturalist and phenomenological approaches to complement tests, surveys, and structured interviews". More and more ethnographers and qualitative researchers are using pre-designed conceptual frameworks and pre-structured instrumentation, especially when dealing with more than one institution or community. Stainback and Stainback (1988, p8) suggest "... differences in qualitative and quantitative research do not necessarily imply the superiority of one methodology compared to the other as a research strategy. Rather, these differences may make one methodology more useful than the other depending on the research question." Incorporating the above viewpoints, Table 5.1 summarises the differences between quantitative and qualitative research paradigms.

Table 5.1. Quantitative Vs. Qualitative Research Paradigms

Dimensions	Quantitative Paradigm	Qualitative Paradigm
Nature of reality	Reality is objective and singular, apart from the researcher.	Reality is subjective and multiple, as seen by participants in a study.
Relationship of researcher to that researched?	Researcher is independent from that being researched. Researcher is an outsider – reality is what quantifiable data indicate it to be.	Researcher interacts with that being researched. Researcher is an insider – reality is what people perceive it to be.
Role of values	Value-free and unbiased	Value-laden and biased
Language of research	Formal Non-human Based on the set definitions Impersonal voice Use of numbers	Informal Human Evolving decisions Personal advice Use of words
Process of research	Deductive process Controlled conditions Cause and effect Static design – categories isolated before study Context-free Generalisations leading to prediction, explanation, and understanding Accurate and reliable through validity and reliability tests	Inductive process Naturalistic conditions Mutual simultaneous shaping of factors Emerging design – categories identified during research process Context-bound Patterns, theories developed from understanding Accurate and reliable through verification by gaining real, rich and deep data
Nature of the problem	Previously studied by other researchers so that body of literature exists; known variables; existing theories	Exploratory research; variables unknown; context important; may lack theory base for study
Researcher's psychological attributes	Comfort with rules and guidelines for conducting research; low tolerance for ambiguity; time for a study of short duration	Comfort with lack of specific rules and procedures for conducting research; high tolerance for ambiguity; time for lengthy study.
Research Approaches	Experiment Survey and survey research Analysis of collected data Structured observation Content analysis	Biography Phenomenological study Grounded theory study Ethnography Case study

Source: Based on Guba and Lincoln (1988); McCracken (1988), Stainback and Stainback (1988), Creswell (1994); Bryman (1996).

5.2.2 Triangulation

A review of both quantitative and qualitative research reveals that each approach has its own strengths and weaknesses, and there is not a single best way to conduct research. This raised the issue of linking paradigms with methods and using multiple methods in research (Guba, 1990; Patton, 1980). There are three schools of thinking regarding this 'paradigm debates'. They are purists, situationalists, and pragmatists (Rossman and Wilson, 1985; Lancy, 1993; Creswell, 1994). According to purists, paradigms and methods should not be mixed together. While the situationalists assert that certain methods are appropriate for specific situations, and the pragmatists intend to integrate multiple methods in a single study, arguing that researchers should take advantage of both paradigms in understanding social phenomena. Denzin (1978) first borrowed the term 'triangulation' from navigation and military strategy to formalise the concept of employing combined methodologies to enrich data by formal measuring instruments, such as questionnaires and standardised interview schedules, or using them as checks on one another (Denzin, 1989). Stainback and Stainback (1988) argue that a combination of qualitative and quantitative approaches will combine discovery and verification, understanding and prediction, and validity and reliability within the research design. Thus it depicts a more complete picture of a phenomenon, utilising the respective strength of each approach (Bryman, 1988). Greene et al (1989) advanced five purposes for combining methods in a single study:-

- Triangulation in the classic sense of seeking convergence of results;
- Complimentary, in that overlapping and different facets of a phenomenon may emerge;
- Developmentally, wherein the first method is used sequentially to help inform the second method;
- Initiation, wherein contradictions and fresh perspectives emerge;
- Expansion, wherein the mixed methods add scope and breadth to a study.

Denzin (1989) states that triangulation is actually a combined methodology to study a specific phenomenon. This can be either a 'between-method', providing cross-validation of outcomes, or a 'within method', using a variety of techniques within a stated method to gather information about an aspect of the research that will confirm the outcome.

Jick (1983) describes triangulation as the integration and blending of data and methods on a continuum of simple to complex designs. Simple combination designs are identified as the "quantification of qualitative measures and the use of field observations to strengthen statistical data". On the complexity side, triangulation can "capture a more complete, holistic, and contextual portrayal of the unit(s) under study" (Jick, 1983; p138).

Nevertheless, the researchers such as Jick (1983) and Simon (1994) agree that there is no single theory or research text that explains how to integrate the two methods into a single research study. Jick (1983, p135) gives the notion that qualitative and quantitative methods should be "viewed as complementary rather than as rival camps", but makes it clear that those who support "mixing methods" fail to provide adequate guidelines on how this should be accomplished. Simon (1994), capitalising on this gap, presents a generative strategy, which argues for combining content analysis, depth interviews, participant observation and a review of the literature with open-ended, non-standardised schedule interviews prior to the use of questionnaires.

Another advancement of triangulation is made by Creswell (1994). Based on previous work, he proposes three models of combined designs: the two-phase design, the dominant-less dominant design, and the mixed-methodology design.

- In a two-phase design, the researcher conducts a qualitative phase of the study and a separate quantitative phase of the study. The advantage of this approach is that the two paradigms are clearly separate, and the researcher is able to present thoroughly the paradigm assumptions behind each phase. The disadvantage is that the reader may not discern the connection between the two phases.

- In a dominant-less dominant design, the researcher presents the study within a single, dominant paradigm with one small component of the overall study drawn from the alternative paradigm. The advantage of this approach is that it presents a consistent paradigm picture in the study and still gathers limited information to probe in detail one aspect of the study. The main disadvantage is that qualitative purists would see this approach as misusing the qualitative paradigm because the central assumptions of the study would not link or match the qualitative data collection procedure. So do quantitative purists.

- In a mixed-methodology design, the researcher would mix aspects of the qualitative and quantitative paradigms at all or many methodological steps in the design. This approach takes advantages of both quantitative and qualitative paradigms and fully uses the inductive and deductive thinking. However, it requires the researcher to have sophisticated knowledge of both paradigms, and the ability of conveying the linking to the readers.

5.3 CHOSEN RESEARCH DESIGN AND METHODS

The above literature review of research design and methodology concludes the fact that there is not a single, standard, correct method of carrying out research. Each design has its own strengths and weaknesses, so does each data collection method. The choice of research design and data collection methods depends on the availability of resources and how best the method can generate the required information (Peterson, 1982). Because this research's objectives are to establish causal relationships between knowledge management orientation, learning orientation, innovative orientation, market orientation and organisational performance, quantitative analysis is most appropriate to establish the relationship. Structural equation modeling is employed to data analysis. To ensure maximisation of validity and reliability, this study conducted a thorough literature review in all perspectives pertinent to knowledge management and performance outcomes.

5.3.1 Literature Review

Creswell (1994) summarises that literature in a research study attains several purposes: (1) It shares with the reader the results of other studies that are closely related to the study being reported (Fraenkel and Wallen, 1990). (2) It relates a study to the larger, ongoing dialogue in the literature about a topic, filling in gaps and extending prior studies (Marshall and Rossman, 1989). (3) It provides a framework for comparing the results of a study with other findings.

The general principles of using literature review vary in different type of research. In qualitative research, the literature should be used in a manner consistent with the methodological assumptions. It should be used inductively so that it does not direct the questions asked by the researcher. Even in qualitative research, use of literature of theory varies too. In theoretically oriented qualitative studies such as ethnographies, the literature is normally introduced by researchers early in their study plan. While in grounded theory, case studies, and phenomenological studies, literature will be less used to set the stage for the study (see Table 5.2) (Creswell, 1994).

Table 5.2 Criteria And Method Type For Using Literature

Use of Literature	Criteria	Examples
The literature is used to 'frame' the problem in the introduction to the study.	Some literature must be available.	Typically used in all qualitative studies, regardless of type.
The literature is presented in a separate section as a 'review of the literature'.	This approach is often acceptable to an audience most familiar with the traditional, positivist approach to literature reviews.	This approach is used with quantitative studies and those qualitative studies employing a strong theory and literature background at the beginning of a study, such as ethnographies, critical theory studies.
The literature is presented in the study at the end; it becomes a basis for comparing and contrasting findings of the qualitative study.	This approach is most suitable for the 'inductive' process of qualitative research; the literature does not guide and direct the study, but rather becomes an aide once patterns or categories have been identified.	This approach is used in all types of qualitative designs, but it is most popular with grounded theory, wherein one contrasts and compares his or her theory with other theories found in the literature.

Source: Adapted from Creswell, 1994, p23

In contrast to qualitative studies, quantitative studies include a substantial amount of literature in a separate section to provide direction for the research questions. Literature is often reviewed in the early stage of the study to define a problem, and deduct research propositions and hypotheses (Creswell, 1994) (see Table 5.2). The literature review may take different forms, and no consensus exists about which form is preferable. (1) Integrative literature is simply summaries of past research. (2) A theoretical review focuses on extant theory that relates to the problem being studied. (3) A methodological review focuses on methods and definitions, which involves not only a summary of studies but also an actual critique of the strengths and weaknesses of the method sections (Cooper, 1984).

The literature review conducted for this research is primarily to facilitate the quantitative study. Thus the literature review focuses on familiarising with existing research, identifying the knowledge gap in the area of knowledge management performance, composing theoretical constructs of knowledge management orientation and organisational innovativeness, defining the research questions and tentatively proposing research hypotheses and research models. The literature review also incorporates the above-mentioned three types of literature: integrative, theoretical, and methodological, mainly presented in four chapters:-

- Chapter 2: This chapter is conducted in a methodological manner combined with some integrative review on the concept of knowledge and knowledge management. Through reviewing existing research on knowledge management capability, this chapter critically examines strengths and weaknesses of previous research, and develops a theoretical construct of knowledge management orientation, which is the core of this research.

- Chapter 3: This chapter reviews organisational performance in both an integrative and methodological way. Traditional performance indicators are briefly introduced. Furthermore, soft indicators of performance outcomes, such as market orientation, learning orientation, and innovative orientation are reviewed in an extensive manner.

- Chapter 4: This chapter adopts a theoretical literature review aiming at identifying both empirical and theoretical basis in related to the problems identified. Research models and hypotheses are developed based on this theoretical review.

- Chapter 5: This chapter adopts an integrative and methodological approach to literature on research design and methodologies. Chosen design and methods are discussed based on the listed advantages and disadvantages in relation to the nature of this research.

Furthermore, the literature review presented in the above mentioned chapters not only relates this research to the ongoing research dialogue within the knowledge management field, provides a framework for research hypotheses, but also links this research to previous studies in market orientation, learning orientation, innovation and performance outcomes. Thus efforts are made to use existing scales of these variables in order to optimise validity and reliability of research findings.

5.3.2 Survey Research

Survey research is the prime vehicle of this research. The principle advantages of survey research are: it can collect a great deal of data about an individual respondent at one time; and the survey research method is versatile enough to be used in virtually any setting (Aaker et al 1998).

De Vaus (1986, p3) emphasises that survey research is characterised by a structured or systematic set of data, which he referred to as a variable by case data matrix. Information is gathered about the same variables or characteristics from at least two (normally far more) cases and ends up with a data matrix. There are three major methods to elicit information from respondents: the personal interview, the mail questionnaire, and the telephone survey. A survey research should possess the following characteristics (Pinsonneault and Kraemer, 1993):

- Survey research is a quantitative method, requiring standardised information from and/or about the subjects being studied.

- The main data collection method is by asking people structured and predefined questions. Their answers, which might refer to themselves or to some other unit of analysis, constitute the data to be analysed.

- Information is generally collected about a fraction of the studied population, but it is collected in such a way as to be able to generalise the findings to the population. The sample should be large enough to allow extensive statistical analysis.

Oppenheim (2000) distinguishes two types of survey research: descriptive survey and analytical survey.

- Descriptive survey is aimed largely at fact-finding in nature, or making predictions. Its purpose is to count, and chiefly tell us how many (what proportion of) members of a population have a certain opinion or characteristics or how often certain events occur together. They are not designed to explain anything or to show causal relationships between one variable and another.

- Analytical survey is aimed at exploring causal relationships between variables, and often undertaken to test specific propositions or hypotheses. It answers the question of 'why' rather than 'how many' or 'how often'.

Based on the above literature of survey research, this study uses analytical survey as the dominant component, because the objectives of this research is to identify the causal relationship between market orientation, learning, innovation, knowledge management, and performance outcomes. Hypotheses of relationships between these variables are formulated through literature review and will be analysed using quantitative data collected via survey research. Data collection methods for the survey research will be further discussed in the following section.

5.3.3 Structural Equation Modeling

Because the nature of this research is to identify the causal relationship between the above aspects, quantitative analysis is considered the most appropriate for testing the hypothesis. Specifically, structural equation modeling is used.

5.3.3.1 What is Structural Equation Modeling

Structural equation modeling is a multivariate statistical technique for testing structural theory that has gained popularity in many business disciplines. The methodology takes a confirmatory (i.e. hypothesis-testing), rather than an exploratory, approach to data analysis. It typically represents "causal" processes that generate observations on multiple variables (Bentler, 1988). The term structural equation modeling conveys two important aspects of the procedure: (1) The causal processes under study are represented by a series of structural (i.e. regression) equations; and (2) These structural relations can be modelled pictorially to enable a clearer conceptualisation of the theory under study. The primary task in structural equation modeling is to determine the goodness of fit between the hypothesised model and the sample data. Typically, the researcher imposes the structure of the hypothesised model on the sample data, and tests how well the observed data fit into this restricted structure (Byrne, 1998). It tests the hypothesized model statistically to determine the extent to which the proposed model is consistent with the sample data. If the goodness-of-fit is adequate, the model argues for the plausibility of postulated relations among variables; if it is inadequate, the tenability of such relations is rejected (Byrne, 1988).

5.3.3.2 Advantages of Structural Equation Modeling

Fornell (1982) notes that structural equation modeling demonstrates several advantages over the older generation of multivariate procedures, which make structural equation modeling a popular methodology for nonexperimental research. These highly desirable features are (quoted in Byrne, 1988, p4):-

- Structural equation modeling takes a confirmatory approach, which is particularly effective for hypothesis testing. By demanding that the pattern of intervariable relations be specified a priori, structural equation modeling lends itself well to the analysis of data for inferential purposes. Whilst most other multivariate procedures are essentially descriptive by nature, such as exploratory factor analysis, so that hypothesis testing is difficult, if not impossible.

- Structural equation modeling provides explicit estimates of these error variance parameters, whilst traditional multivariate procedures are incapable of either assessing or correcting for measurement error. Indeed, traditional methods rooted in regression, or the general linear model, assume that errors in the explanatory (i.e. independent) variables, vanish. Thus, applying those traditional methods when there is error in the independent variables is tantamount to ignoring error, which may lead to serious inaccuracies, especially when the errors are sizeable. Such mistakes are avoided by structural equation modeling.

- Structural equation modeling can incorporate both unobserved and observed variables, whilst traditional methods are based on observed measurements only.

- There are no widely and easily applied alternative methods for modeling multivariate relations, or for estimating point and/or interval indirect effects; these important features are available using structural equation modeling methodology.

5.3.3.3 Types of Variables

It is useful to distinguish terminologies of different types of variables used in structural equation modeling, namely latent variables vs. observed variables; and exogenous vs. endogenous variables (Byrne, 1988, p4-5).

- Latent variables are those variables that cannot be observed and measured directly. The researcher must operationally define the latent variable in terms of behaviour believed to represent it. By doing this, a latent variable is linked to one that is observable, and thereby making its measurement possible. Assessment of the behaviour constitutes the direct measurement of an observed variable, in spite of the indirect measurement of an unobserved variable. These measured scores are termed observed variables, and serve as indicators of the underlying construct that they are presumed to represent in structural equation modeling.

- Exogenous variables are synonymous with independent variables. They cause fluctuations in the values of other variables in the model. Endogenous latent variables are synonymous with dependent variables, and are thus influenced by the exogenous variables in the model, either directly or indirectly. Changes in the values of exogenous variables are not explained by the model, whilst fluctuation in the values of endogenous variables is explained by the model because all variables that influence them are included in the model specification.

5.3.3.4 The Measurement Model vs. The Structural Model

Structural equation modeling usually can be separated into measurement models and a structural model. The measurement models address the reliability and validity of the indicators in measuring the latent variables or hypothetical constructs, while the structural model specifies the direct and indirect relations among the latent variables and describes the amount of explained and unexplained variance in the model (Byrne, 1998, p3; Schumacker & Lomax, 1996, p50-51). Based on work by James et al (1982), Joreskog and Sorbom (1993), Schumacker and Lomax (1996) recommended a two-step modeling approach to assessing the fit of the structural model independent of the measurement models.

5.3.3.5 A Two-Step Approach

James et al (1982) propose a two-step modeling approach to structural equation modeling, emphasising the analysis of two conceptually distinct latent variable models: measurement and structural. Anderson and Gerbing (1988) further describe this approach by stressing that the measurement model provides an assessment of convergent and discriminant validity and the structural model provides an assessment of predictive validity. Mulaik et al (1989) further expand the idea of assessing the fit of structural equation models among latent variables (i.e. the structural model) independent of assessing the fit of the observed variables to the latent variables (i.e.

the measurement model). The rationale is that even with a few latent variables, most parameter estimates define the relationships of the observed variables to the latent variables in the measurement model, rather than the structural equation relationships of the latent variables themselves.

Joreskog and Sorbom (1993, p113) summarise these considerations and comment: "the testing of the structural model, i.e. the testing of the initially specified theory, may be meaningless unless it is first established that the measurement model holds. If the chosen indicators for a construct do not measure that construct, the specified theory must be modified before it can be tested. Therefore, the measurement model should be tested before the structural relationships are tested. It may be useful to do this for each construct separately, then for the constructs taken two at a time, then for all constructs simultaneously. In doing so, one should let the constructs themselves be freely correlated, i.e. the covariance matrix of the constructs should be unconstrained."

This research follows this advice. Before testing the structural models, which is reported in Chapter 7, the measurement model for each construct is tested and reported in Chapter 6. The convergent and discriminant validity of measurement constructs are established before moving on to analysis of the structural model.

5.3.3.6 Strategies for Structural Equation Modeling

There are three generic strategies for testing structural equation models (Joreskog, 1993), namely strictly confirmatory, alternative models, and model generating.

- Under the strictly confirmatory strategy, the researcher postulates a single model based on theory, collects appropriate data, and then tests the fit of the hypothesized model to the sample data. From the results of this test, the researcher either rejects or fails to reject the model; no further modification to the model is made.

- Under the alternative models strategy, the researcher proposes several alternative (i.e. competing) models, all of which are grounded in theory. Following analysis of a single set of empirical data, the researcher selects one model as most appropriate in representing the sample data.

- Under the model generating strategy, when a hypothesised model is rejected on the basis of its poor fit to the sample data, the researcher proceeds in an exploratory (rather than confirmatory) fashion to modify and reestimate the model. The primary focus is to locate the source of misfit in the model and to determine a model that better describes the sample data.

The model generating strategy is most commonly used among all three. The reason is that, given the many costs associated with the collection of data, the researcher would rarely afford to terminate the research on the basis of a rejected hypothesised model (Byrne, 2001). However, when adopting the model generating strategy, it is essential for the researcher to bear in mind the ultimate objective of model generating, i.e. to find a model that is both substantively meaningful and statistically well-fitting. Therefore, although respecification may be either theory or data driven, the ultimate model must be able to make sense of theoretical frameworks.

In this research, both strictly confirmatory analysis and model generating strategies are employed. In Chapter 6, the model generating strategy is used to analysise the measurement models for knowledge management orientation and innovative orientation, because these are both new scales and it is very unlikely that both models fit very well without any respecification. Whereas strictly confirmatory analysis is used to report the measurement models for learning orientation and market orientation, because these are both established constructs through empirical tests. In Chapter 7, the analysis of the structural model is mostly conducted under the strictly confirmatory analysis with very little exception, which will be discussed in details in Chapter 7.

5.3.3.7 Model Identification

Structural equation modeling may be just-identified, overidentified, or underidentified (Byrne, 2001, p35).

- A just-identified model is one in which there is a one-to-one correspondence between the data and the structural parameters, i.e. the number of data variances and covariances equals the number of parameters to be estimated. However, in spite of the capability of the model to yield a unique solution for all parameters, the just-identified model is not scientifically interesting because it has no degrees of freedom and therefore can never be rejected.

- An underidentified model is one in which the number of parameters to be estimated exceeds the number of variances and covariances. Thereby, the model contains sufficient information from the data for the purpose of attaining a determinate solution of parameter estimation. In another word, an infinite number of solutions are possible for an underidentified model.

- An overidentified model is one in which the number of estimate parameters is less than the number of data points (i.e. variances, covariances of the observed variables). This results in positive degrees of freedom that allow for rejection of the model. Thus an overidentified model is rendered for scientific use. For the hypothesis testing purpose, this research adopts the method of an overidentified model.

5.3.3.8 Model Estimation

Structural equation modeling typically tests how well the observed data fit a restricted structure, by imposing the structure of the hypothesised model on the sample data (Byrne, 2001). Fitting a model to data means solving a set of equations. It is usually assumed that the sample data follow a multivariate normal distribution, so that the means and covariance matrix contain all the information. The basic model is DATA=MODEL+ERROR. This essentially requires estimation of model parameters that can be a good representative of the corresponding population values. The method most widely used for estimation is Maximum Likelihood estimation, which assumes multivariately normal data and a reasonable sample size, e.g. about 200 cases. Byrne (2001) notes that there are a few assumptions about Maximum Likelihood estimation: (1) The sample is very large (asymptotic, i.e. minimum variance and unbiasedness); (2) The distribution of the observed variables is multivariate normal; (3) The hypothesised model is valid; (4) The scale of the observed variables is continuous.

In this research, Maximum Likelihood estimation method is used in data analysis, its assumptions having been considered. A total sample size of 213 cases was used. The scale of the observed variables is continous (7-point likert scale). Additionally, the hypothesised model was developed from systematic review of theories and extant research findings. Therefore, the data that was used in this study meet the above criteria 1, 3 and 4. Regarding the requirement of normal distribution of observed variables, many authors such as Micceri (1989) and Breckler (1990) warned that the majority of research in behavioural research, personality and social psychological journals failed to acknowledge the normal theory assumptions. Even fewer explicitly considered whether these assumptions had been violated. Micceri (1989) points out that true normality is exceedingly rare in education and psychology.

West et al (1995) suggest that normality be examined univariately and multivariately. Examinations of the skewness and kurtosis of the univariate distributions provide only an initial check on multivariate normality. "If any of the observed variables deviate substantially from univariate normality, then the multivariate distribution cannot be multinormal. However, the converse is not true. Theoretically, all of the univariate distributions may be normal, yet the joint distribution may be substantially multivariately nonnormal."(p60-61) Ideally, the multivariate normality should be examined using such methods as developed by Mardia (1970, see also D'Agostino, 1986), as suggested by West et al (1995). However, in reality, tests of multivariate normality are very strict and easily detect a very large percentage of data as multivariate nonnormal. Consequently, West et al (1995) suggest rules of thumb for univariate skewness and kurtosis: for a sample size of 200 or less, moderately nonnormal data (skewness <2 and kurtosis <7) are acceptable – the robust standard errors provides generally accurate estimates. If the sample size is very large (n>500), nonnormality is not required as an assumption. Raykov and Marcoulides (2000, p27) also suggest that recent research has shown that Maximum Likelihood method can be used for data with minor deviations from normality.

This study followed the rules of thumb laid out by West et al (1995), i.e. skewness should be less than 2, and kurtosis should be less than 7. The statistics show that the absolute value of skewness of the data in this study is between 0.175 and 0.360, and the absolute value of kurtosis is between 0.004 and 0.414. Therefore the normality of the data in this study is accepted. Details of these descriptive statistics are reported in Appendix 5.

5.3.3.9 Critiques on Structural Equation Modeling

Structural equation modeling contains a variety of powerful analysis techniques, and has a positive impact on research in the applied fields. However, some issues have been raised against the use of structural equation modeling. One of the issues is the importance of statistical assumptions of normally distributed data and needed sample sizes in order to have confidence in results. The restrictions of sample size can have significant impact on the outcomes of structural equation modeling. This will be further discussed in Chapter 7: Data Analysis- The Structural Model.

Another issue, probably more important, is the issue of causal interpretation in structural equation modeling. However we all know that correlation does not mean there is a causal relationship. Cliff (1983) discusses a number of fallacies that are the result of causal interpretation of correlation data. Simply speaking, researchers should remind themselves that the fact that a structural equation model has been corroborated by the data, does not mean that it has been proven true. It has just not been rejected, but there may be competing models that would not have been rejected either.

5.4 CHOSEN DATA COLLECTION METHODS

Data collection methods are unique to a particular research agenda, in that data collection should occur in a designed inquiry after a long series of steps of defining problem, constructing theoretical frameworks, constructing a proposed model, establishing the design inquiry, and determining sampling procedures (Miller, 1991; p117). As Miller (1991, p117) states:-

"No procedure and no technique for data collection are powerful in their own right. The theory should be the guide for fruitful research. The techniques are powerful tools for data collection, if – and only if – they are appropriate in terms of the nature and characteristics of the problems. And significant problems can be formulated only after gaining substantial familiarity with the universe of discourse and not before." As previously mentioned, the main objective of this study is to identify causal relationships between knowledge management orientation, learning orientation, market orientation, innovation and organisational performance. Therefore quantitative methods are chosen for testing these causal linkages. Within the social science field, survey research is the most widely used quantitative approach.

There are three types of data collection methods that can be used in survey research design: personal interview, telephone interview, and mail survey.

5.4.1 Personal Interview

In a personal interview, the respondents are asked questions by the interviewer in a face-to-face situation. Personal interviews vary in terms of their degree of structure and directness. Structure refers to the amount of freedom the interviewer has to adapt questions according to needs during each interview, while directness involves the extent to which the respondent is aware of the nature and purpose of the survey (Tull and Hawkins, 1990; Webb, 1992). Personal interviews, especially unstructured interviews, have an advantage over telephone interviews or postal surveys in that they are able to generate large amounts of rich and meaningful data. Furthermore, the personal interview is an excellent method for coping with complex questions. On one hand, respondents can ask interviewees for clarification if necessary; on the other hand, interviewers are able to probe for answers, use follow-up questions, and gather information by observation. With personal interviews, researchers can be confident of the response rate.

However, personal interviews are not economically viable for research that requires a large sample. In addition, interviewers must be trained to minimise any possibility of bias during interviews: interviews may unwittingly influence or lead respondents into giving certain responses. The presence of an interviewer may also inhibit the accuracy of a respondent's answers, especially when answering sensitive questions where they would be more inclined to give a 'don't know' answer. Data collection in this manner can be time consuming and, therefore, is an unsuitable technique if the researcher is constrained by time.

5.4.2 Telephone Interview

Telephone interviews involve the presentation of the questionnaire through the medium of the telephone. This method is the most suitable for accessing the difficult-to-reach respondents by way of repeat calling (Peterson, 1982). Geographic coverage can be expanded without a dramatic increase in cost. This method also enables researchers to collect data within a short period of time. Although the method requires moderate expenditures, it can only be used if the interview length is short.

Its limitation is that it is unsuitable for long questionnaires because respondents can only be reached by telephone for a limited period of time each day. It is impossible to convey pictures, graphics or complicated rating scales over the telephone. The cost will be higher if the sample is geographically dispersed. Other limitations include an inability to contact target respondents whose phone numbers are unlisted or those who are not available by phone.

5.4.3 Mail Survey

The mail survey is a method of self-administered questionnaires that is the least expensive, requires minimal staff, and can be easily carried out. This method carries a greater likelihood of contacting otherwise inaccessible respondents, for example chief executive officers and top ranking corporate officials. A major advantage of the mail questionnaire is its ability to accommodate specific graphics and visual aids to convey complex information for evaluation (Baker, 1991). It also allows respondents time to reflect on the questions posed, or check records before answering. Hence, more accurate answers can be given and respondents will not be subjected to interviewer bias. Furthermore, respondents can take their time to respond. They will not feel pressured into giving answers to difficult and complex questions. Nachmias and Nachmias (1981, p180) listed five advantages of survey questionnaires:-

- Lower cost: mail questionnaire is cheaper than personal interview especially when the population under study is spread geographically. Under such circumstances the cost of interview could become prohibitive and mail questionnaire may be the only feasible instrument.

- Reduction in biasing error: Biasing error may result from the personal characteristics of the interviewer and from variability in their skills. Mail questionnaire eliminates this completely.

- Greater anonymity: Greater anonymity is associated with the absence of interviewer. This is more helpful if the survey deals with sensitive issues.

- Considered answers and consultations: Mail questionnaires are preferable when questions demand considered rather than an immediate answers.

- Accessibility: Mail questionnaires permit wider geographical contact with minimal cost.

The most significant drawback of mail survey, however, is its low response rate (Peterson, 1982, Weiers, 1984; Parasuraman, 1986; Baker, 1991). This is because researchers can only rely on an introductory letter and written instructions to motivate respondents to reply. Long questionnaires covering a difficult and complex subject may also deter respondents from completing the questionnaire. Certain questions may be left unanswered if there is no interviewer to provide explanations or probe for answers. The researcher must possess an up-to-date and accurate mailing list for a mail survey to be successfully conducted.

5.4.4 Chosen Data Collection Method

The choice of data collection methods depends on the available resources and how best the method can generate the required information (Peterson, 1982; Weiers, 1984).

Personal interviews were ruled out because of money, time and staffing constraints. The researcher is only able to secure limited funding for this research, and therefore unable to employ and train interviewers. Additionally, sampled respondents are not confined to one geographical area but are scattered all over England, Wales and Scotland. This makes personal interviews of a large-scale unrealistic.

Telephone interviews were also ruled out because the target respondents, who are senior to executive management personnel, are considered to be unreceptive to telephone interviews. It is difficult to find the right time to make calls because respondents must be reached during office hours when they are normally busy. There is a risk to find sufficient number of respondents, as some respondents may refuse to participate in face-to-face or telephone interviews because they do not wish to be identified.

The most appropriate data collection method for this survey research is mail survey, because the questionnaire can be designed to gather relevant information quickly and cheaply over an extensive geographical coverage. Furthermore, this research requires testing of hypotheses, which in turn requires a large enough sample size to perform quantitative data analysis in a valid and reliable manner. Mail survey permits a wider and more representative distribution of the sample to be reached at a reasonable cost.

5.5 SAMPLING PROCEDURE

By definition, a sample is a group selected from a population in some way so as to ensure that, for the characteristics being investigated, the group is typical (Black, 1993, p43). A selected sample that to the greatest extent represents the population is of utmost importance, because a survey research is commonly concerned with making inferences about a population on the basis of information from a sample. How a researcher chooses a sample from a population will determine whether the members of the sample group can be considered to be truly representative of that population. Sampling procedures thus become a principle part of the research design, and determine the accuracy of the survey results and its generalisability. Sekaran (1992, p226) define sampling as "... the process of selecting a sufficient number of items from the population so that by studying the sample, and understanding the properties or the characteristics of the sample subjects, we will be able to generalise the properties or the characteristics to the population elements."

5.5.1 Sampling Methods

Broadly speaking there are two types of sampling: probability and non-probability sampling (Nachmias and Nachmias, 1981; Trochim, 2000). Alternatively, random and non-random sampling (Black, 1993).

Kerlinger (1986) defines "randomness means that there is no known law, capable of being expressed in language, that correctly describes or explains events and their outcomes." Random sampling is "that method of drawing a portion (sample) of a population so that all possible samples of fixed size *n* have the same probability of being selected" (Kerlinger, 1986). Sample representativeness can be achieved through one of a number of processes of selection that are designed to ensure this characteristic, most of which are based upon some aspect of random selection. A random sample may have a finite probability of not representing the population. Certainly the more random samples taken, the less likely it will be to get non-representative samples and the stronger the justification of the results.

There are several types of random sampling, such as simple random sampling, stratified random sampling, cluster sampling, and stage sampling (Blum and Foos, 1986; Cohen and Manion, 1989; Kerlinger, 1986; Black, 1993).

- Simple random sampling involves taking a random sample directly from the population. However, it is limited by the availability of a complete list of the population, one that could be very large and not feasible or even possible to obtain.

- Stratified random sampling consists of taking random samples from various strata, which are different sub-populations within a larger population. By defining strata, the researcher can identify more relevant ones that are worth investigating.

- Cluster sampling randomly selects clusters of subjects, thus avoids the difficulty of sampling from a large population.

- Stage sampling is an extension of cluster sampling and involves successive random selections from each previously selected cluster.

Non-random sampling provides less justifiably representative samples, but is used for the sake of cost efficiency and convenience. Typical techniques that have been applied in previous research are: purposive sampling, quota sampling, convenience, accidental or volunteer sampling, and snowball sampling (Cohen and Manion, 1989; Kerlinger, 1986).

- Purposive sampling is achieved by the researcher through hand-picking subjects on the basis of traits to give what is felt or believed to be a representative sample. This requires all the relevant variables or traits to be identified so the sample would include a cross-section of persons possessing these.

- Quota sampling involves the researcher non-randomly selects subjects from identified strata until desired numbers are reached. Such an approach ensures that each group is of the same size, which can be important for some inferential statistical tests. Whilst the disadvantage is that the numbers may not reflect the true proportions of sub-populations in the whole population.

- Snowball sampling involves the researcher identifies a small number of subjects with the required characteristics, who in turn identify others etc. This is of value when a researcher has little idea of the size or extent of a population, or there simply may be no records of population size. The disadvantage is that it is difficult to defend the representativeness of the sample.

Indeed, there is widespread recognition among organisational researchers that investigations using sample survey are rarely based on probability samples. Instead, convenience samples tend to prevail. Bryman (1988) offers explanation as to why non-probability sampling is widespread:

- Practical reasons such as increased difficulty in gaining access to firms for survey research.

- Strategic reasons, in other words a non-random sampling may be deemed better than a random one, or a random sample may not be a feasible plan of action. Random sampling is unlikely to be feasible in the event that there is no frame or when the frame would be absurdly expensive or even impossible construct.

5.5.2 Sampling Error

Sampling errors result from actually taking the sample in a less random manner (Moore, 1991). Non-sampling errors occur being unrelated to the method of sampling, i.e. the sample may be random and representative, but the resulting data may not be complete or accurate. The sources of errors may come from the following (Moore, 1991):-

- Missing data may be due to the inability to contact a selected subject or not all the selected subjects choosing to participate, resulting in volunteers.

- Response errors will arise from subjects providing inaccurate information, or the questions may be misunderstood.

- Processing errors can arise from coding data or entering it into computer files.

- Errors from methods of data collection include such problems as timing of a survey, wording of questions and mediums used.

5.5.3 Sampling Procedure

The sampling method adopted in this research is random sampling, because most statistical analysis requires a normally distributed data, and a good representation of the population researched. Random sampling is the appropriate way to meet this requirement. The sampling procedure follows a process of defining the population, identifying the sampling frame, determining the sample size, and selecting respondents and unit of analysis (see Figure 5.1).

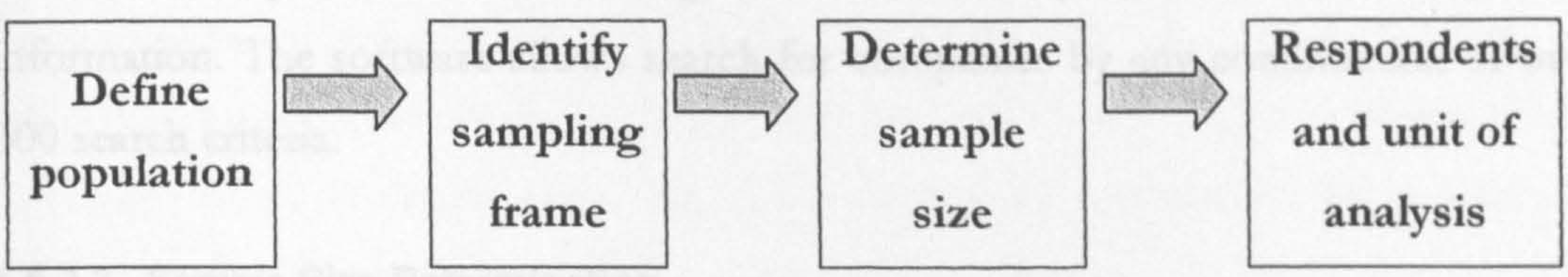


Figure 5.1 Procedure For Drawing A Sample

5.5.3.1 Population

Knowledge management came to be a management concern in the 1990s. The practice of knowledge management requires companies' commitment to resource allocation to knowledge management programs either formally or informally. Indeed, only in relatively larger companies exist such functions as information department, or knowledge officer, or Chief Knowledge Officer, Director of Intellectual Capital, Director of Knowledge and Learning, etc. Because the main focus of this research is knowledge management, the population of interest was focuses on the medium to large organisations in the UK, who were most likely to be engaged in knowledge management activities. The DTI uses the criterion of employee numbers: Micro firm: 0-9 employees; small firm: 0-49 employees; medium firm: 50-249 employees; large firms: over 250 employees. According to these criteria, the population of this research is identified as all medium to large companies with no less than 50 employees, whose Primary Trading Address or Trading Address if no Primary Trading Address are within the regions of England, Scotland and Wales.

5.5.3.2 Sampling Frame

The sample was drawn from the FAME database (Financial Analysis Made Easy). The database was first launched in 1988 by Bureau van Dijk Electronic Publishing, and has undertaken continuous improvement. FAME contains up to 10 years of detailed information for 1.3 million companies plus summarised information for a further 1 million companies. FAME covers all UK registered companies including those that have recently formed and have yet to file their first set of accounts. The detailed information includes company profile, profit and loss account, balance sheet, cash flow statement, ratios and trends, credit score and rating, complete lists of holding companies, subsidiaries and directors, shareholders (including enhanced shareholders option), all "site/trading" addresses, activity information, miscellaneous information. The software allows search for companies by any combination of over 300 search criteria.

5.5.3.3 Sample Size Determination

Kerlinger (1986) notes that when an average or other statistics is applied for a sample, the researcher is estimating the value for the whole population. Thus there will be some error, which will be dependent on the size of the sample. The smaller the sample, the greater the error and vice versa. The sample size must be appropriately selected. As sample size increases, the cost of conducting the survey also increases. Too large a sample might lead to inefficiency and wastage of resources (Peterson, 1982). Yet too small a sample will yield information that might not be valid for making inferences about the population. Therefore a researcher must create a balance between cost and sample size that will enable a reasonable level of accurate and precise generalisations.

Another consideration is the sample size that corresponds to the degree of accuracy that is required in the sample, and the extent to which there is variation in the population with regard to the key characteristics of the study (de Vaus, 1986, p32). Statistical analysis such as factor analysis, regression analysis, and structural equation modeling requires a minimum sample size for the model to be accurately measured. This will be discussed in detail in the data analysis chapter.

The population of this research is medium to large companies (with at least 50 employees) with their Primary Trading Address/Trading Address if no Primary Trading Address within the regions of England, Scotland and Wales. By applying the above criteria to the FAME database, a total of 3,520 companies met the criteria (Data accessed on 25 September 2002). Although the population is not an enormous number of companies, a census of the population would still be beyond the financial limitation and time constraints. A sample of 1500 companies was randomly selected from the population.

5.5.3.4 Respondents and Unit of Analysis

A unit of analysis is the unit from which we obtain information – the unit whose characteristics we describe (de Vaus, 1992). Nunally (1978) suggests that the subjects should be those for whom the instrument is intended, and the entities about which the theory poses concepts and relationship. A unit of analysis can be individuals, groups, organisations, or society.

Since the main objective of this study is to identify causal relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and organisational performance, the unit of analysis was individual organisations. The informants were senior managers and middle managers who were able to comment accurately on the surrey questionnaire because of their work experience. Therefore, the management personnel's perception of the above listed variables is measured. They are regarded as the main source of information and selected to receive the questionnaire.

5.6 MEASUREMENT AND SCALES

Survey instrument development is an important phase of this research, as it is the main process through which the validity and reliability of the measurements is achieved. Measurement is one of the most fundamental elements in research. It is a problem shared by researchers in all disciplines where an attempt is made to quantify observations (Rose and Sullivan, 1993). In the case of social research, measurement is the process of assigning numbers to observation according to a set of rules (Walsh, 1990, p7). Walsh (1990) explains that the observations being measured are variables, or anything that can change in value from case to case.

The rules that we use to assign numbers to observations result in various levels of measurement. Information comes to us from the real world in many forms, ranging from crude to refined. The statistics used are greatly dependent on the relative crudity or refinement of our measures. There are four levels of measurement with different properties involved, namely nominal, ordinal, interval and ratio scales (de Vaus, 1986; Walsh, 1990; Rose and Sullivan, 1993).

- A nominal scale is one in which numbers are assigned to individuals or phenomena. Their purpose is merely to give a label to a class or category. Nominal characteristics do not show any order of distinctions. Using nominal data, very little statistical analysis can be carried out. Only percentages, frequencies, and the mode can be calculated, and limited statistical techniques such as Chi-square can be used to determine significant differences between categories.

- Ordinal level data are numbers that are assigned to data on the basis of some order, i.e. the data is in an order that ranges from the bottom to the top. However, it is not possible to quantify precisely how much difference there is between the categories (de Vaus, 1986).

- Interval level data represent numbers used to rank items such that numerically equal distance on the scale represents equal distance in the property being measured. This is, in addition to classification and order, we have equal units of measurement. There are precisely defined intervals between and among observations. What is lacking with an interval scale is a stable starting point (an absolute zero), and consequently, the scales cannot be interpreted in any absolute sense. However, we can perform a large number of mathematical operations with interval data, not possible with nominal and ordinal data.

- A ratio scale is a type of scale that uses numbers that rank items in order that the intervals are equal in measurement and have an absolute zero point. With ratio data, all descriptive as well as inferential statistics are applicable.

Table 5.3 Levels Of Measurement

	Level of Measurement			
	Nominal	Ordinal	Interval	Ratio
Are there different categories?	Yes	Yes	Yes	Yes
Can I rank the categories?	No	Yes	Yes	Yes
Can I specify the differences between categories numerically?	No	No	Yes	Yes

Source: De Vaus (1986)

Table 5.3 is a summary of characteristics of all the measurement scales as adapted from De Vaus (1986). In social sciences, the most common type of data generally treated as using an interval scale attitude measures (Tull and Hawkins, 1990; Walsh, 1990). For example, the Likert scale that requires respondents to state their degree of agreement or disagreement to a given statement. Tull and Hawkins (1990) emphasise that it is obvious that the interval between each of these degrees of agreement or disagreement is not exactly equal, but more researchers treat these data as if the intervals are equal. This is because the result of most statistical techniques is not seriously affected by this minor non-compliance to the interval scale requirements.

In this questionnaire, most of the data were assessed by Likert scales, which are treated as an interval scale. The reasons for this are (1) These scales have been found to communicate interval properties to the respondent, and therefore produce data that can be assumed to be intervally scaled (Schertzer and Kernan, 1985; Madsen, 1989); (2) In management literature, Likert scales are normally treated as interval scales (for example, Koli and Jaworski, 1990; Narver and Slater, 1990). This enables the research to describe the nature of research subjects, as well as to explain the relationships between variables by employing inferential statistics; (3) Most observed variables used in structural equation modeling are defined as being measured on a linear continuous scale. However, this does not preclude ordinal or nominal measured variables (Schumacker and Lomax, 1996). In this research, all the variables included in structural equation modeling are Likert scale. Efforts were made to utilise existing measurement scales, such as learning orientation and market orientation. In case of knowledge management orientation, innovative orientation and performance measurement, when there is not an appropriate existing scale, constructs are developed carefully from strong theoretical foundation, which are reported in Chapter 2 and 3. The validity and reliability of these scales are subject to confirmatory factor analysis, which will be reported in Chapter 6.

5.7 VALIDITY AND RELIABILITY OF RESEARCH DESIGN

The impact of management studies depends upon the appropriateness and rigor of the research methods chosen. Issues on design choices such as instrumentation, data analysis, and construct validation, etc. affect research findings and conclusions. This leads to the continuous focus on reliability and validity of research methods. Many authors have addressed the issues from different aspects, resulting in a wide range of labels that are used to describe reliability and validity of measures in the methodological literature. The following section of this thesis summarises literature on reliability and validity and discusses the relevant methods chosen to maximise reliability and validity of this research. Statistical assessment of both aspects will be discussed in Chapter 6 and 7.

5.7.1 Validity

Validity refers to the accuracy of a measure. Any instrument must measure what it was intended to measure, i.e. the instrument, as the operational definition, must be logically consistent and cover comprehensively all aspects of the abstract concept to be studied. Ideally, it should be possible to confirm this through alternative, independent observation. De Vaus (1992) elaborates that in fact it is not about the measure that is valid or invalid, rather it depends on how we have defined the concept it is designed to measure. An instrument may be a good measurement, but not necessarily valid for the concept to be measured.

Generically speaking, there are five types of validity: face validity, content validity, construct validity, predictive validity (Anderson and Gerbing, 1988; Churchill, 1995;

Trochim, 2000), and external validity (Yin, 1989; Cook and Campbell, 1976; Sackett and Larson, 1990).

- Face validity concerns how closely the operationalisation appears 'on its face' to measure what it is supposed to measure, or whether it is a good translation of the construct or not. This is not an empirical way of determining the validity of a test, and probably the weakest way to try to demonstrate construct validity.

- Content validity addresses the adequacy with which the domain of the characteristics is captured by the measure (Churchill, 1995). Essentially, we check the operationalisation against the relevant content domain for the construct. This approach assumes that we have a good detailed description of the content domain.

- Construct validity refers to three related issues: unidimensionality, convergent validity, and discriminant validity. Unidimensionality is concerned with the degree to which a set of items forming an instrument all measures an underlying construct. In convergent validity, we examine the degree to which the operationalisation is similar to (converges on) other operationalistions that it theoretically should be similar to. Discriminant validity, on the other hand, is the degree to which a concept differs from other concepts.

- Predictive validity concerns whether a measurement predicts what it should be able to predict. The predictive ability of measurement as an important aspect of validity has been emphasised in different ways. One commonly mentioned is nomological validity, which refers to the degree to which predictions from a theoretical model are confirmed (Cronbach and Meehl, 1955). A measure has nomological validity when relationship between the measure and an independent measure of relevant criterion is confirmed. Another one is what Yin (1989) called 'internal validity'. Internal validity concerns causality aiming to establish a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from deceptive relationships.

- External validity refers to generalising across times, settings, and individuals (Cook and Campbell, 1976; Sackett and Larson, 1990). Research findings must establish the domain to which it can be generalised. Therefore, it is the type of validity that is closest to the concept of generalisability (Sackett and Larson, 1990). Scandura and Williams (2000) suggest that external validity, or generalisability is better addressed by methods such as formal theory and sample surveys. Generating a model from literature review and testing the model using a sample survey would allow the researcher to report more generalisable results and increase external validity.

It is generally agreed that no one research strategy can adequately cover all aspects of validity. Researchers need to adopt different strategies to maximize different kinds of validity. Triangulation is suggested as an effective strategy to achieve more valid and reliable research results. However, due to limitations of research resources, the nature of research projects, and the skills of the researcher, triangulation is not always possible. In the particular case of this research, the prime task is to identify causal relationships between variables. Quantitative methods are more effective in solving the concerned issues. The aspects of validity as mentioned above are dealt with care.

- The face validity and content validity are optimised though extensive literature review. The operationlisation of each measurement is checked against the relevant content domain for the construct. Efforts have been made to use the measures that have been previously tested. In some instances, modifications were made and new measures were created. These will be listed in the following sections. New items used in the survey questionnaire and hypotheses development followed from a critical review of theories and previous research findings.

- Construct validity is empirically tested from two steps. Firstly, convergent validity is tested through confirmatory factor analysis. Then, discriminant validity is tested using Pearson correlation. By establishing convergent and discriminant validity, the unidimensionality of measurement constructs is supported. These will be reported in Chapter 6 the Measurement Models.

- Predictive validity is empirically tested and reported in Chapter 7. Structural equation modeling is used to establish causal relationships between variables. Structural equation modeling, referring to a whole set of goodness-of-fit indices, is recognised as a most effective method for predictive validity.

- External validity of this research is achieved through adopting a quantitative research strategy, followed by critical review of all relevant research fields in terms of identifying theoretical foundations and cross-comparison with previous research findings. Survey research is adopted and aims to achieve a generalisable findings, by adopting the random sampling method. Details of questionnaire administration are reported in the later section of this chapter.

5.7.2 Reliability

Reliability measures if the operations of the study can be repeated with the same outcomes. A reliable instrument is one that is free from random error and able to yield consistent results. An instrument is reliable when it arrives the same result on repeated occasion (de Vaus, 1986). Mehrens and Lehmann (1984) describe that "reliability can be defined as the degree of consistency between two measures of the same thing." The two measures can mean a variety of combinations, for example: two different tests or measuring instruments, two halves of the same test, the same test or instrument applied on two occasions, two scorers using the same observation schedule, etc. (Black, 1993). High reliability means that if you measure something today with your instrument, you should get very much the same results some other time, assuming that what or who you are measuring has not changed. On the other hand, it should be noted that while it is possible to have an instrument that is valid but not reliable, an instrument that is not valid will never be reliable. In reality, the true score usually does not exist since we cannot make the perfect measuring instrument, in particular those to measure abstract concepts. Consequently, all reliability coefficients are estimates, depending on what form of reliability one is using. There are a few types of reliability tests (Mehrens and Lehmann, 1984):

- Stability: It is often referred to as the test-re-test estimate of reliability. It involves administering the instrument to the same group of people on two different occasions. This is restricted by the difficulty of getting subjects to do the same thing twice, and the possibility of something happening to subjects between applications that would affect the second score.

- Equivalence: It involves administering two equivalent forms of the same measuring instrument to the same group on the same day. This approach is most appropriate for tests of content.

- Internal consistency: It is the indicator of the homogeneity of questions in a test or questionnaire, or the relative degree to which the responses to individual items correlate with the total test score. This approach allows a reliability coefficient to be calculated on one administration of a test. The most common version of this is the Pearson product moment correlation coefficient, based on splitting the test into two equal parts, or Cronbach alpha.

- Inter-judge (-scorer) reliability: This is highly appropriate for activities where personal judgement is involved, where checking the consistency of observations when several observers are collecting data is required. This estimate requires scoring by another (or more) independent judge of a sample of subjects. The correlation between the judges gives an estimate of reliability.

- Intra-judge (-scorer) reliability: this is of value when considerable data have been collected over a period of time by a researcher and the consistency of observations or classifications should be checked. A sample (randomly selected) set of observations is repeated at a later data and the reliability calculated.

The test-retest method is the only way to check on the reliability of single questions (see de Vaus, 1986; Sekaran, 1992). The reliability co-efficient obtained with repetition of an identical measure on a second occasion is called test-retest reliability. The higher it is, the better the test-retest reliability, and hence the stability of the measure across time. In this survey, a test-retest is impractical, since it is difficult to convince the actual respondents to participate in a second survey using the same questionnaire. This is also highlighted by de Vaus (1992) who states that "Unfortunately the test-retest method is a poor one. It is often very difficult to give the same test to the same sample twice... Another problem is memory: people may remember their answer on the first occasion and answer the same time to be consistent. This can artificially inflate the apparent reliability of the question."

The reliability of this research is achieved through the following measures: minimising the source of unreliability, multi-item indicators, and the use of questions from reputable studies.

- Minimising source of unreliability: De Vaus (1986) argues that a question may be unreliable due to bad wording: people may understand a question differently on different occasions. Another source of error is when people have no opinion or have insufficient information. In the survey, bad wording is minimised by extensive review of past literature, critical discussion with the supervisor, and expert review of the questionnaire. Difficult questions were reworded, ambiguous questions were amended, and a number of repetitive questions were removed (see Appendix 4).

- Multi-item measure: De Vaus (1986) argues that multi-item indicators are the best way to create reliability, as well as offering an easier method of assessing their reliabilities. Moreover, single-item measures are said to have almost certainly a strong yes-saying bias, while multi-item measures eliminate this.

- Use of questions from reputable study: Effort has been made to use the measures from previous studies, but in some instances, modifications were made and new measures were created, using the steps specified above. The source of measuring instruments is explained in the next section of this chapter. Reliability of the measurement instruments was checked and achieved by using Cronbach's alpha coefficient, which will be explained in later chapters.

- Cronbach's Alpha test of reliability: This is a model of internal consistency, based on the average inter-item correlation. Cronbach's Alpha was calculated for each variable in the data analysis chapter.

The above discusses the importance of validity and reliability of research in generalising research findings. Guba (1978) questions the value of generalised research results, in particular with reference to evaluation studies that tend to be fraught with local variables. In the meantime, the situation can exist where there is such tight control on all the variables to ensure generalisability that any parallel group would be rare. In some circumstances, things can change so drastically that not only is generalisability difficult, but replication is impossible. Despite the controversy surrounding this issue, in academic society it is still commonly purported that research should produce generalisable results. Black (1993, p55) notes "without generalizability of results, social science research in general will tend to limp along, not benefiting from the efforts of others, collecting results on a piecemeal basis." The more generalisable the results, the greater the possibility that one can begin to resolve conflicting hypotheses. By following the above identified methods, this research is aimed to achieve optimised validity and reliability.

5.8 QUESTIONNAIRE ADMINISTRATION

Questionnaire design and administration is a very important part of this research. As previously mentioned, measurements are carefully selected from existing research when available. In cases when existing measurement scales are not available, questions were drawn from strong theoretical background. The questionnaire uses 7-point Likert scale, ranging from 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neither disagree or agree, 5=slightly agree, 6=agree, 7=strongly agree.

5.8.1 Format of Questionnaire:

The format of questionnaire is a most important criterion that determines response rate (Babbie, 1986; Parasuraman, 1986; Nachmias and Nachmias, 1992). The appearance of the questionnaire and how the questions are structured within it can influence a respondent's co-operation, as well as the quality of data collected

(Parasuraman, 1986). Parasuraman (1986) specifies that in a mail survey, both the layout and appearance of the questionnaire are crucial, because they are the only elements that will entice respondents to cooperate. He recommends that a questionnaire must appear attractive, neat and uncluttered. While a professionally produced attractive questionnaire can increase the chances of respondent co-operation, an uncluttered questionnaire with clear instruction will minimise the respondent's errors.

Although the questionnaire used in this study appears lengthy, certain measures were incorporated to ensure a reasonably good response rate. For example, much effort was devoted to ensure that the layout was pleasing to the eyes of the respondents. A combination of different font sizes, font styles and underlined words were used to add emphasis and to improve the questionnaire's appearance. Questions were deliberately grouped into sections and sub-sections using sub-numbering systems to enhance the format of the questionnaire. Instead of ending up with hundreds of individual questions, questions were grouped into sections.

It has been ascertained that design techniques such as providing a 'don't know' response option, or reassuring respondents that they need not feel compelled to answer every questionnaire item have proved effective in reducing but not eliminating uninformed response (Wilcox, 1994). Therefore, a middle option representing a 'neither agree nor disagree' answer is always given in this questionnaire.

It is often thought that a lengthy questionnaire will not attract the respondent to co-operate (Hoinville et al 1978; Tull and Hawkins, 1990). However if the sample is made up of people with a special interest in the subject or with a high standard of literacy, they will not be deterred by lengthy questionnaires (Hoinville et al 1978). Weiers (1984) also agrees that it is a mistake to squeeze questions together so that less paper is required. Hoinville et al (1978) suggest that a short questionnaire do not necessarily encourage response because a complex subject covered by a very short questionnaire will appear trivial, especially to special population samples whose members know a great deal about the subject of the study. This may deter them from participating.

5.8.2 Pilot Test

The survey was conducted during December 2002 and March 2003 in the format of mail questionnaire. Regarding the types of questions asked, close-ended questions were used. While it is admitted that open-ended questions give more flexibility to the respondents to express their own answers, the researcher decided to use close-ended questions, as they provide uniformity to responses and hence facilitate data coding and data entry during quantitative data analysis. The questionnaire was firstly pilot tested among ten academic colleagues at the university's Management Research Centre for their insights in designing a questionnaire. Six people responded and represented 60% response rate of the pilot test. All feedback was reflected and actions taken accordingly (see Appendix 4).

5.8.3 Inducing Responses Using Mail Survey

An important issue of mail survey is how to increase the rate of response by giving incentives and conducting follow-ups. Literature review of experimental evidence relating to industrial mail surveys has revealed six methods that can raise response rates (Jobber, 1986; Jobber and O'Reilly, 1996). These are a prior telephone call, prepaid monetary incentives, non-monetary gifts, the use of stamps on return envelopes, granting anonymity to respondents, and following-up the first mailing with a second covering letter and questionnaire.

Another set of review summarises many research studies on response-increasing techniques for mail surveys (see Goyder, 1982; Yu and Cooper, 1983; Baumgartner and Heberlein, 1984). The review isolates five factors: saliency, sponsorship, follow-up, incentives, and personalisation.

Dillman (1978) proposes a theoretical and practical framework for mail questionnaires that integrates several of the above procedures for increasing response rates. He views questionnaires as a social exchange between the researcher and the respondent. According to social-exchange theory, the recipient will return the questionnaire if the costs of doing so are less than the perceived benefits. Time and effort are perhaps the major costs. A recipient may reject a poorly designed, lengthy, or confusing questionnaire simply because it seems to take too long to complete or it brings into question the integrity of the research. For that reason, questionnaires and mailing processes must be designed carefully. Because researchers can seldom offer truly valuable rewards, and questionnaires are often lengthy, the researchers must be concerned with all the controllable details of the survey design.

As far as this questionnaire concerned, the incentives employed are personalisation and provision of a summary of the survey results.

Each questionnaire is accompanied by a personalised covering letter using three types of appeal: help-the-sponsor, egoistic and social, to encourage co-operation (Weiers, 1984). The letter was individually addressed to the company director to give it a personal touch. It was thought that respondents would be more likely to open the envelope, which was specifically addressed to them (Webb, 1992; Weiers, 1984). In the mean time, the research indicates the suitability of other management personnel who may be able to complete the questionnaire, because the company director is very likely to be extremely busy and have no time to fill it in.

The respondents were promised a summary of the survey results. This incentive has been found to enhance the rate of response (Weiers, 1984), and a summary was offered to those who might be interested in the outcome of the survey and who printed their names and addresses for the summary to be sent to.

5.8.4 Response Rate

The final questionnaire (see Appendix 2) was sent to a total of 1500 companies, randomly selected from the FAME database. All questionnaires were sent with an enclosed pre-paid return envelope.

A reminder letter, together with another copy of the questionnaire and a prepaid return envelope, was sent to those who had not replied within three weeks after the initial mailing of the questionnaires. It is proven that reminders are highly effective in increasing the response rate (Hoinville et al 1978; Jobber, 1986; Jobber and O'Reilly, 1996). Another three weeks later, a second reminder was sent to companies who had not replied. A number of apologies were received from companies who would not be able to complete the questionnaire, as well as a number of returned mails due to wrong addresses or departure of addressees. Figures are shown in the following Table 5.4.

Table 5.4 The Response Rate Of Apologies And Returned Mails

	Number	Percentage*
Apologies	52	3.5%
Returned mails	59	3.9%
Total	111	7.4%

* Percentage is based on a total of 1500 companies.

96 completed questionnaires were received after the first mailing, and 82 received after the first follow-up. A further 53 were received after the second follow-up. A total of 231 completed questionnaires were received, representing 15.4% of response rate (The rate for the usable responses is 14.2%). Deducting the number of returned mails from the sample size, the adjusted response rate is 16.0%, and the total usable response rate is 14.8% (see Table 5.5).

Table 5.5 The Response Rate

	No of response	Percentage*
First mailing	96 (87 usable)	6.4%
First follow-up	82 (78 usable)	5.5%
Second follow-up	53 (48 usable)	3.5%
Total response	231	15.4% (adjusted 16.0%)
Total usable response	213	14.2% (adjusted 14.8%)

* Percentage is based on a total of 1500 companies. Figures in the brackets are adjusted based on 1441 companies excluding 59 returned mails due to wrong addresses or departure of addressees.

According to Hart (1987), it is common that response rates from the business population range between 18 and 27%. The response rate of this survey research is slightly lower. Therefore, the reasons of the relatively lower response rate were investigated by examining the responses from companies who apologised for not being able to complete the questionnaire. The following reasons have been identified. Among all these reasons, time is the biggest barrier, followed by the complex nature of the research.

- Time-consuming: Companies receive many requests every week to complete questionnaires. Due to business commitments and current resource levels, they are unable to participate. In fact, some companies have introduced a policy that they do not participate in any type of surveys unless a positive response was required under the terms of any applying legislation.

- Complexity: Some companies are commercially or operationally integrated into another large company. These companies do not have whole or partial control over full operations of the companies. Therefore, it is difficult for them to complete the questionnaire due to the wide range of coverage of business operations in the questions.

- Industry restriction: Some companies are regulated and unable to answer some of the questions, in particular the innovative orientation section of the questionnaire.

- Other reason: Changes of companies, restructuring, downsizing, mergers and acquisitions, etc. all affect companies' willingness and suitability of participating the survey.

5.8.5 Non-response Bias

Wilcox (1994) attributes the lack of sample representativeness to at least two reasons. The first is because the sample selected is not representative of the frame or population of interest. Whilst the second is the non-response bias. Wilcox (1994) further comments that while the literature concerning sampling and inferential statistics is well developed and readily available, the procedures for dealing with non-response bias is less developed.

Luck and Rubin (1987) suggested three approaches for handling the non-response situation. The first one is that the researcher assumes that there are no differences in the answers given by respondents and those who did not respond. In order to justify this assumption, the researcher must provide substantial evidence. The second approach is that the research should compare known characteristics of the population sampled with those of the respondents. In this way, the research can assess if the sample possesses characteristics that are a close approximation of the population. The third approach is that non-respondents should be re-contacted by sending out a second wave of questionnaires by telephone. Comparisons can then be made between answers given by respondents with those of non-respondents.

In this study, the first approach is adopted. It was first assumed that there was no bias in the response. To test this, a technique suggested by Armstrong and Overton (1977) was employed to compare the differences of characteristics of different groups of respondents based on the period of response time. Respondents were divided into three groups, the first mailing, the first follow-up and the second follow-up. It was assumed that the last group who responded to the second follow-up were most similar to non-respondents (Armstrong and Overton, 1977). Using ANOVA test, three groups were compared on all the variables. The results in Table 5.6 revealed that there were no significant differences (at 5% significant level) between the three groups. Because the group sizes are unequal, the post-hoc Turkey's-b test using the harmonic means of the group sizes also evidenced that all the variables are homogenous (at 5% significant level) between three groups.

Table 5.6. ANOVA Test For Differences Between Groups

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
MARKOR	.303	2	210	.739
LEARNOR	.885	2	210	.414
KMO	1.004	2	210	.368
INNOVOR	2.435	2	210	.090
PERFORM	.021	2	210	.979

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
MARKOR	Between Groups	4.028	2	2.014	2.047	.132
LEARNOR	Between Groups	4.233E-03	2	2.117E-03	.002	.998
KMO	Between Groups	1.355	2	.678	.742	.477
INNOVOR	Between Groups	2.597	2	1.299	1.682	.189
PERFORM	Between Groups	1.805	2	.903	1.048	.352

Note: The scale used is 7-point Likert scale: 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neither disagree or agree, 5=slightly agree, 6=agree, 7=strongly agree.

5.8.6 Companies' Profile

Companies that participated in this survey represent a cross-section of medium to large services and manufacturing companies in the UK. As indicated in Table 5.7, the manufacturing industry represents 52.1% of the total respondents. This is followed by the services industry, which accounts for 28.20% of the total respondents. The retailing industry represents 4.7% of the total respondents. The remaining 15% of respondents are from other industries, which are not specified in this survey.

Table 5.7 Profile Of Companies By Industry Type

Industry Type	Frequency	Percentage
Services Industry	60	28.20
Retailing	10	4.70
Manufacturing	111	52.10
Others	32	15.00
Total	213	100.00

Source: Survey data analysis

5.9 CONCLUSIONS

This chapter first reviewed the different research paradigms and their strengths and weakness in different types of studies, and identified the appropriate research design and methodology for this particular research. Due to the quantitative nature, this research is based on existing theories of knowledge management, organisational learning, market orientation, organisational innovativeness and performance outcomes and identifies problems that are incorporated in the relevant research models and hypotheses. To test research hypotheses, survey questionnaire was employed to collect quantitative data to be subsequently analysed using SPSS and AMOS. This chapter reported the process of research design, sampling, questionnaire design and administration, as well as response rate, non-response bias, and company profiles of respondents in a descriptive manner.

Chapter Six

Data Analysis: The Measurement Models

*****

6.1 INTRODUCTION

Data analysis is reported in two chapters. Chapter 6 reports data analysis of the measurement models of knowledge management orientation, organisational innovativeness, learning orientation, innovative orientation and performance; Chapter 7 reports the structural model. A total number of 213 cases are used in the data analysis. Table 6.1 is a list of statistical tests employed in this research and their main objectives. As discussed in Chapter 5 Research Design and Methodology, the model generating strategy is adopted to analyse the measurement models for knowledge management orientation and innovative orientation, whilst a strictly confirmatory analysis strategy is used to report the measurement models for learning orientation and market orientation since both are well established scales. Maximum Likelihood estimation method was used for data analysis. Overidentified models are rendered for model identification.

Table 6.1 A Summary Of Statistical Tests And Their Objectives

Steps	Indicators	Objectives
The measurement models	Chronbach reliability test, correlation coefficient, Chi-square, Chi-square/df, degree of freedom, p value, GFI, RMSEA, PCLOSE, PGFI, NFI, CFI, RMR, AGFI, NCP, regressions, squared multiple correlations, critical ratio (t-value)	To assess the reliability, the convergent and discriminant validity of measurement constructs.
The structural model	Chi-square, Chi-square/df, degree of freedom, p value, GFI, RMSEA, PCLOSE, PGFI, NFI, CFI, RMR, AGFI, NCP, regressions, squared multiple correlations, critical ratio (t-value)	To establish the direct and indirect relationships between all latent variables; To assess the predictive validity.

Structural equation modelling differs, in the determination of model fit, from other multivariable statistical approaches such as the analysis of variance, multiple regression, path analysis, discriminant analysis, etc. The other multivariable statistical approaches use only observed measures that are assumed to be measured without error, and have associated statistical tests with known distributions. Structural equation modelling, however, does not use a single goodness-of-fit criterion to assess model fit between the hypothesised model and the sample data. Generally, researchers recommend that various goodness-of-fit criteria be used in combination to assess model fit, model comparison, and model parsimony (Schumacker and Lomax, 1996; Byrne, 2001). The three types of model fit indices are further discussed in the following:-

Model fit

Model fit statistics in SEM determines the degree to which a model fits the sample data based on the discrepancy between the unrestricted sample covariance matrix (original, S) and the restricted covariance matrix (reproduced, Σ). Model fit criteria, commonly used by researchers, are chi-square (χ^2), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI).

The Chi-square (χ^2) value relative to the associated degrees of freedom indicates the extent to which the observed matrix (S) differs from the estimated matrix (Σ). It tests the extent to which the residuals in the matrix (Σ - S) are zero (Bollen 1989). Researchers are interested in obtaining a nonsignificant χ^2 value that is less than the tabled value with associated degrees of freedom. The probability value (P) associated with χ^2 value indicates the likelihood of obtaining a χ^2 value that exceeds the χ^2 value under the assumption of no difference between S and Σ. That is, the higher the probability associated with χ^2, the closer is the fit between the hypothesized model (under the assumption S=Σ) and the perfect fit (Bollen 1989).

However, since the χ^2 test is very sensitive to sample size (it increases with the sample size) (Joreskog and Sorbom, 1993), researchers have developed other goodness-of-fit indices in order to address the limitations of the χ^2 test. One of these fit statistics is the χ^2/df ratio, which normalise the χ^2 value in relation to the degrees of freedom (Wheaton et al., 1977). Values of the χ^2/df ratio that are less than or equal to 2.00 represent a very good fit between the hypothesized model and the sample data.

Another fit statistic that is commonly used is the goodness-of-fit index (GFI). The GFI index measures the amount of variance and covariance in the observed matrix (S) that is explained by the estimated matrix (Σ). The adjusted goodness-of-fit index (AGFI) adjusts the GFI index for the degrees of freedom in a model relative to the number of variables. Values of GFI and AGFI close to 0.900 reflect a good model fit (Schumacker and Lomax, 1996; Byrne, 2001).

The root mean square residual (RMR) represents the average residual value obtained by calculating the square root of the mean squared differences between the corresponding matrix elements in S and Σ. It indicates how much the Σ matrix is close to the S matrix. Since the RMR value is based on the unstandardised residuals, it is difficult to be interpretd (Hu and Bentler, 1995; Byrne, 2001), and therefore it is recommended to use the standardised RMR value that is based on using standardised residuals. The standardised RMR ranges from zero to 1.00 where for a well-fitting model this value will be less than or equal to 0.050 (Byrne, 2001).

The root-mean-square error of approximation (RMSEA) represents the error of approximation in population. It measures how well would the model fit the population covariance matrix if it were available. RMSEA value of 0.060 or less indicates a good fit between the hypothesized model and the observed data (Hu and Bentler, 1999). Values as high as 0.080 represent reasonable errors in the population (Browne and Cudeck, 1993). The RMSEA value is sensitive to the degrees of freedom and, therefore, tends to be high for complex models (models with large number of estimated parameters) unless the sample size is large enough (Byrne, 2001).

<u>Model Comparison</u>

Comparative fit indices compare the $\chi 2$ value for the model tested to one from a null model (also called a "baseline" model or "independence" model). The null model is a model which specifies that all measured variables are uncorrelated (there are no latent variables). The null model should always has a very large $\chi 2$ (poor fit). There are several comparative fit indices used by different researchers. They include the Tucker-Lewis index (TLI), the Bentler-Bonett normed fit index (NFI), and the comparative fit index (CFI). Most of these fit indices are calculated by using ratios of the model $\chi 2$ and the null model $\chi 2$ and dfs for the two models. Values of TLI, NFI, and GFI larger than 0.900 reflect a good model fit (Bentler, 1992).

Model Parsimony

Parsimony refers to the number of estimated parameters required to achieve a specific level of fit (Schumacker and Lomax, 1996). Parsimony fit indices are relative fit indices that are adjustments to most of the model fit indices discussed in above. The adjustments are meant to penalize models that are less parsimonious. Parsimony fit indices tend to be low for more complex models. They include the parsimony goodness-of-fit index (PGFI; it is based on the GFI), the parsimony normed fit index (PNFI; based on the NFI), the parsimony comparative fit index (PCFI; based on the CFI mentioned below). A maximised value of the indices indicates a good parsimony fit.

6.2 EXPLORATORY VS. CONFIRMATORY FACTOR ANALYSIS

The best-known statistical procedure for investigating relations between sets of observed and latent variables is that of factor analysis. Using this approach to data analysis, the researcher examines the variances and covariances among a set of observed variables in order to gather information on their underlying latent constructs (i.e. factors). Because factor analysis is concerned with the extent to which the observed variables are generated by the underlying latent constructs, and thus strengths of the regression paths from the factors to the observed variables are of primary interest. Any regression structure among inter-factor relations is not considered in the factor analysis.

There are two basic types of factor analysis: exploratory factor analysis, and confirmatory factor analysis.

- Exploratory factor analysis is designed for the situation where links between the observed and latent variables are unknown or uncertain. The analysis thus proceeds in an exploratory mode to determine how and to what extent the observed variables are linked to their underlying factors. Typically, the researchers wishes to identify the minimal number of factors that underlie covariation among the observed variables. The analysis is exploratory in the sense that the researcher has no prior knowledge that the items do, indeed, measure the intended factors (Comery, 1992; Gorsuch, 1983).

- Confirmatory factor analysis is appropriate when the researcher has some knowledge of the underlying latent variable structure. Based on knowledge of the theory, empirical research, or both, the researcher postulates relations between the observed measures and the underlying factors a priori and then tests this hypothesized structure statistically (Bollen, 1989, Hayduk, 1987). Because confirmatory factor analysis focuses solely on the link between factors and their measured variables, it represents what has been termed a measurement model in structural equation modeling.

Based on the above discussions, this research adopts the method of confirmatory factor analysis to test the fitness of the measurement models for knowledge management orientation, organisational innovative orientation, learning orientation and market orientation.

6.3 CONFIRMATORY FACTOR ANALYSIS: KMO

The confirmatory factor analysis for knowledge management orientation is to test the following hypotheses, which were developed in Chapter 4.

H1.1: Though the knowledge management orientation construct is conceptualised as consisting of five distinct components, the covariance among the 30 items can be accounted for by a single factor (i.e. a general knowledge management orientation factor).

H1.2: Covariance among the items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of knowledge management orientation and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H1.3: Responses to each item are reflective of two factors: a general knowledge management orientation factor and a specific component factor corresponding to one of the five conceptual components. Thus the covariance among the items can be accounted for by a six-factor model.

All models' fitness is evaluated using several criteria, including the Chi-square Goodness-of-Fit test statistic, degree of freedom, Chi-square/df, Joreskog and Sorbom's Goodness-of-Fit index (GFI), Ajusted Goodness-of-Fit index (AGFI), the rescaled noncentrality parameter (NCP), Root-Mean-Square Residual (RMR), Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and PCLOSE. The first regression path in each measurement component is fixed at 1 for model identification purpose.

All 30 items of the knowledge management orientation construct were initially incorporated into the model testing. Several criteria were used to evaluate the items, including each item's error variance estimate; evidence of items needing to cross-load on more than one component factor as indicated by large modification indices; the extent to which items gave rise to significant residual covariance; parsimony purpose; regression coefficient of each item; reliability of the item and the reliability of the whole construct. Additionally, the logic and consistency of data with the theoretical framework is considered when evaluating each items.

As Kohli et al (1993, p470) note that, although from a measurement theory standpoint there is no intrinsic necessity to eliminate items potentially reflective of more than one of the sub-components, from a practical/managerial standpoint it might be desirable to have a scale consisting of single-component items because this would allow the scale to be partitioned into subscales, each of which assesses a specific component of the market orientation construct. This recommendation is adopted in confirmatory factor analysis of this research.

The initial model fit indices without any modification are Chi-square =932.172, Chi-square/df=2.360, df=395, GFI=0.779, RMSEA=0.80, PCLOSE=0.000, PGFI=0.662, NFI=0.769, CFI=0.851, RMR=0.170, AGFI=0.740, NCP=537.172. The initial model needs to be improved to fit the sample data better. Using all the above criteria, 10 items were eliminated. This left 20 items for the final construct of knowledge management orientation: 5 for knowledge-learning culture (K-culture), 3 for knowledge sharing (K-sharing), 4 for knowledge system (K-system), 4 for organisational memory (K-memory), and 4 for knowledge benchmarking (K-benchmarking). The output of initial confirmatory factor analysis of 30 items is shown in Appendix 6. The following is the detailed explanation of each item removed.

- Item 28 and 30 were eliminated based on the low squared multiple correlation which is 0.19 for item 28 and 0.14 for item 30. The estimated regression weights for both items are also the lowest among the all 30 items. The regression weight of knowledge-learning culture to item 28 is 0.44, while the regression weight of knowledge benchmarking to item 30 is 0.37.

- The modification indices (M.I.) show that Item 4 and 5 have the highest residual covariation (M.I.=31.030). From the theory point of view, item 4 is "we systematically de-brief projects, record good practices that we should extend and mistakes that we should avoid." Item 5 is "we make efforts to remember mistakes we made and avoid making similar mistakes in the future." Both items are theoretically associated and are likely to lead to the high residual covariation. By further referring to error variance of both items, item 4 has a higher error variance (=1.44) while item 5 has error variance of 1.38. Therefore item 4 is eliminated from the construct.

- The second highest modification indices are between item 11 (of the second component: K-sharing) and the third component (K-system). This indicates that item 11 is cross loading to the K-system factor. As suggested by Kohli et al (1993), to avoid cross-loading, item 11 is eliminated from the subsequent analysis.

- The error covariance between item 24 and item 25 is very high as indicated in the M.I. (which is 26.968). Item 24 is "in our company, new ideas are evaluated equitably". Item 25 is "in our company, we evaluate ideas based on their merits, no matter who comes up with the ideas". However, both items are very close in either regression weights, or error variances, or squared multiple regressions. Therefore, decision is made on elimination of item 24, because the whole model fitness with item 25 is better than with item 24.

- By examining the error variances and regression weights of all remaining items, and testing the effects on remaining items if items with higher error variances are removed, item 8 and item 16 are further removed. The error variances are 1.18 (for item 8) and 1.23 (for item 16). Some variables with even higher error variances are retained in the construct, removing these items led to decreased effect of other items in the construct.

- The modification indices show a strong regression from Item 14 to Item 5 (M.I.=16.325). When item 14 is removed, the model fit indices improve. Therefore item 14 is deleted.

- For parsimony purposes, item 22 and 27 are removed to improve the model fit indices.

A total of 10 items were removed from the construct, resulting in 20 items consisting of the knowledge management orientation construct. The first-order model fit figures are: Chi-square statistics=341.100, Chi-square/degree of freedom=2.132, Degree of freedom=160, GFI=0.866, RMSEA=0.073, PCLOSE=0.000, PGFI=0.660, NFI=0.857, CFI=0.918, RMR=0.167, AGFI=0.824, NCP=181.100. These results indicate that the respecified model fits better to the sample data than did the original model. Details of variance, covariance, regression weight and squared multiple correlation are shown in the output of standardised/understandardised estimates (see Figure 6.1 and Figure 6.2). Table 6.2 is a summary of the model outputs. From Table 6.2 it is easily noticeable that the regression weights of all variables loading onto their respective factors is between 0.46 and 0.90, with all critical ratios (t-value) above 1.96 (which means that all the regressions are statistically significant at 95% confidence level).

The second-order confirmatory factor analysis as shown in Figure 6.3, Figure 6.4 and Table 6.3, all the first-order five factors load very well onto the second-order Knowledge Management Orientation construct. The regression weights are very close and range from 0.75 to 0.90, with all critical ratios (t-value) above 1.96. The model fit indices show similar result as the first-order confirmatory factor analysis: Chi-square statistics=388.844, Chi-square/degree of freedom=2.357, Degree of freedom=165, GFI=0.839, RMSEA=0.08, PCLOSE=0.000, PGFI=0.659, NFI=0.837, CFI=0.898, RMR=0.184, AGFI=0.795, NCP=223.844. The slight difference in estimations of the first-order and second-order confirmatory factor analysis occurs due to the emergence of slightly different degrees of freedom between executing the first-order and second-order measurement models.

The above statistics show that all the 20 items converge into a single Knowledge Management Orientation construct. The 20 items are partitioned into five subcomponents: K-culture, K-sharing, K-system, K-memory, and K-benchmarking. Each of the 20 items is loaded onto only one of these five factors, without any cross-loading. Therefore, convergent validity is established, and accordingly, the unidimensional representation of the Knowledge Management Orientation construct is supported.

Table 6.2. Loadings Of First-Order CFA For KMO

Variables	R^2	Standard first-order loadings *				
		K-culture	K-sharing	K-system	K-memory	K-benchmark
KM25	.63	.80 ***				
KM26	.64	.80 (12.143)				
KM29	.40	.63 (9.280)				
KM23	.35	.59 (8.630)				
KM21	.50	.71 (10.486)				
K-culture **		-	.71	.50	.54	.78
KM12	.76		.87 ***			
KM13	.81		.90 (15.714)			
KM15	.43		.65 (10.471)			
K-sharing **			-	.53	.55	.66
KM3	.58			.76 ***		
KM1	.73			.85 (12.727)		
KM2	.71			.84 (12.576)		
KM20	.49			.70 (10.222)		
K-system **				-	.77	.70
KM6	.62				.78 ***	
KM5	.33				.58 (8.231)	
KM7	.77				.88 (12.568)	
KM9	.21				.46 (6.508)	
K-memory **					-	.66
KM10	.28					.53 ***
KM17	.55					.74 (7.236)
KM18	.70					.84 (7.625)
KM19	.40					.63 (6.632)
K-benchmarking **						-
Chi-square statistics=341.100, Chi-square/degree of freedom=2.132, Degree of freedom=160, GFI=0.866, RMSEA=0.073, PCLOSE=0.000, PGFI=0.660, NFI=0.857, CFI=0.918, RMR=0.167, AGFI=0.824, NCP=181.100						

* Standard first-order loading is the standard regression weight of the individual variable's loading onto one of the subcomponents. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Standard first-order loading for subcomponents (i.e. K-culture, K-sharing, K-system, K-memory, and K-benchmarking) is the covariance between any two of these subcomponents.

*** Critical ratio (t-value) is not available, because the regression weight of the first variable of each subcomponent is fixed at 1.

Table 6.3. Loadings Of Second-Order CFA For KMO

Factors	R^2	Standard Second-order loadings *
		Knowledge Management Orientation
K-culture	.65	.81 **
K-sharing	.57	.75 (8.292)
K-system	.59	.77 (7.863)
K-memory	.60	.77 (7.874)
K-benchmarking	.82	.90 (6.502)
Chi-square statistics=388.844, Chi-square/degree of freedom=2.357, Degree of freedom=165, GFI=0.839, RMSEA=0.08, PCLOSE=0.000, PGFI=0.659, NFI=0.837, CFI=0.898, RMR=0.184, AGFI=0.795, NCP=223.844		

* Standard second-order loading is the standard regression weight of each of the first-order factor's loading onto the overall knowledge management orientation factor. Figures in parentheses are critical ratios (t-value) from the unstandardised solutions.

** Critical ratio (t-value) is not available, because the regression weight of the first regression weight (i.e. Knowledge Management Orientation → K-culture) is fixed at 1.

Figure 6.1. KMO-First-Order CFA (I)

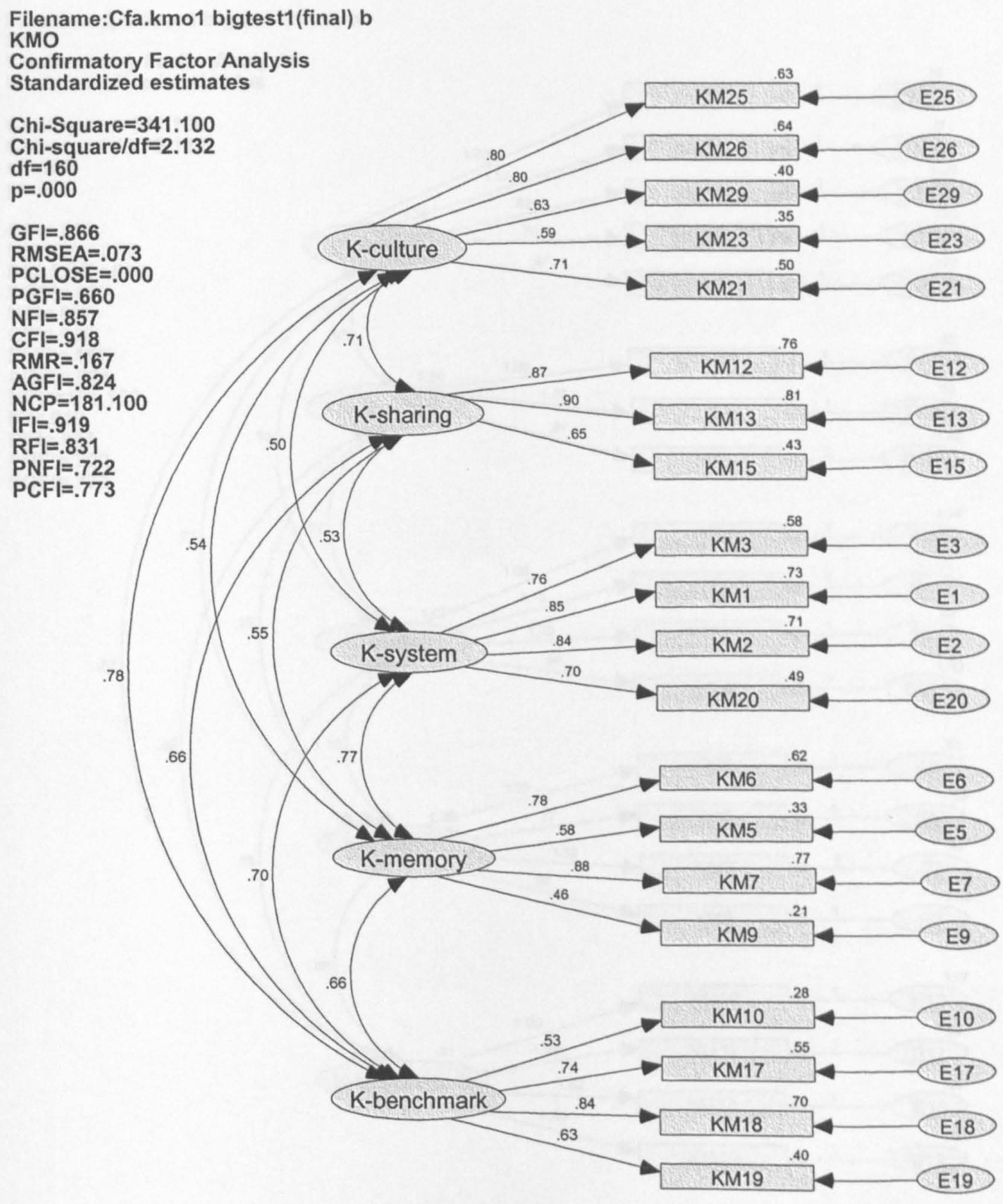


Figure 6.2. KMO- First-Order CFA (II)

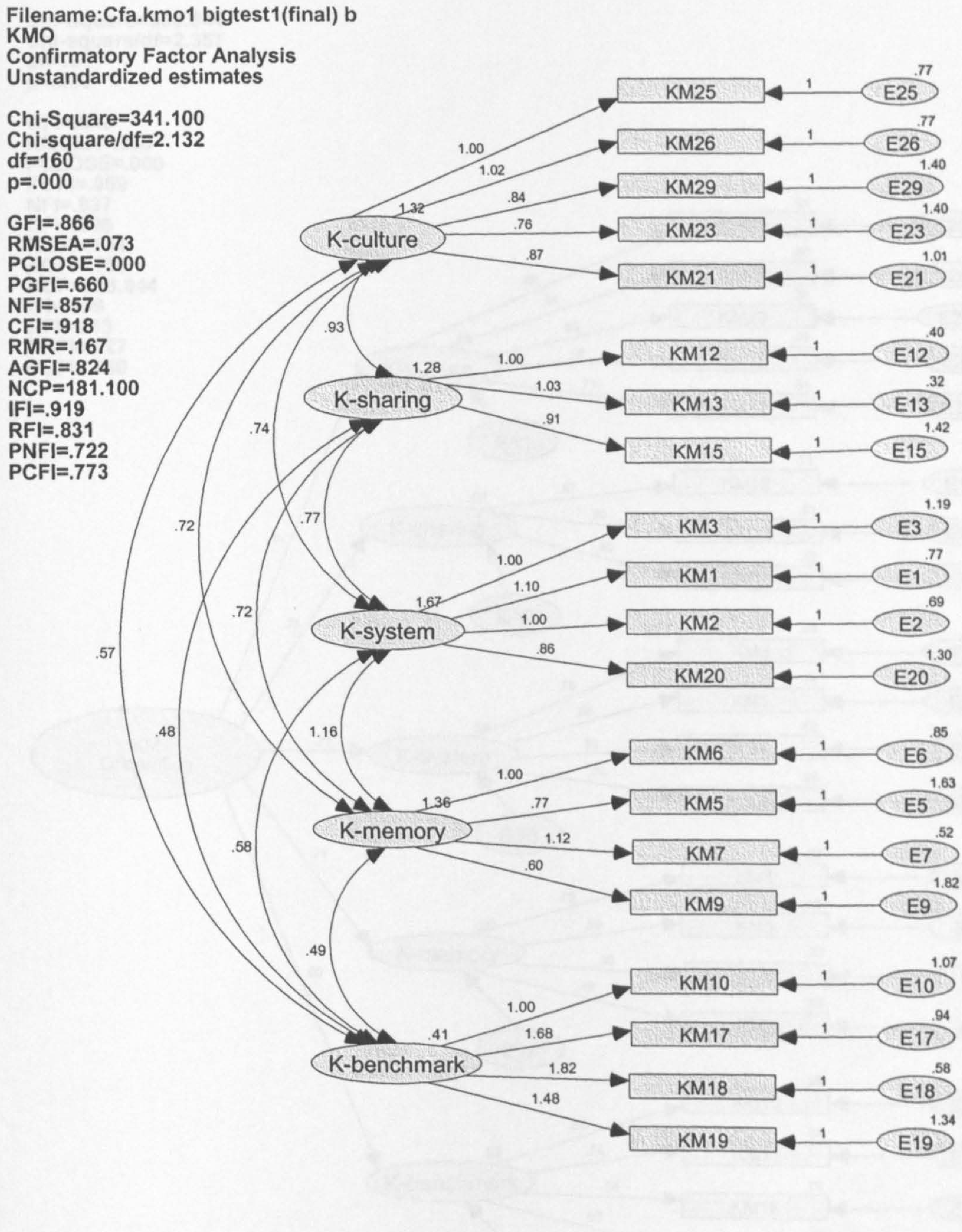


Figure 6.3. KMO- Second-Order CFA (I)

Filename:Cfa.kmo1 bigtest1(final) b - second-order
KMO
Confirmatory Factor Analysis
Standardized estimates

Chi-Square=388.844
Chi-square/df=2.357
df=165
p=.000

GFI=.839
RMSEA=.080
PCLOSE=.000
PGFI=.659
NFI=.837
CFI=.898
RMR=.184
AGFI=.795
NCP=223.844
IFI=.899
RFI=.813
PNFI=.727
PCFI=.780

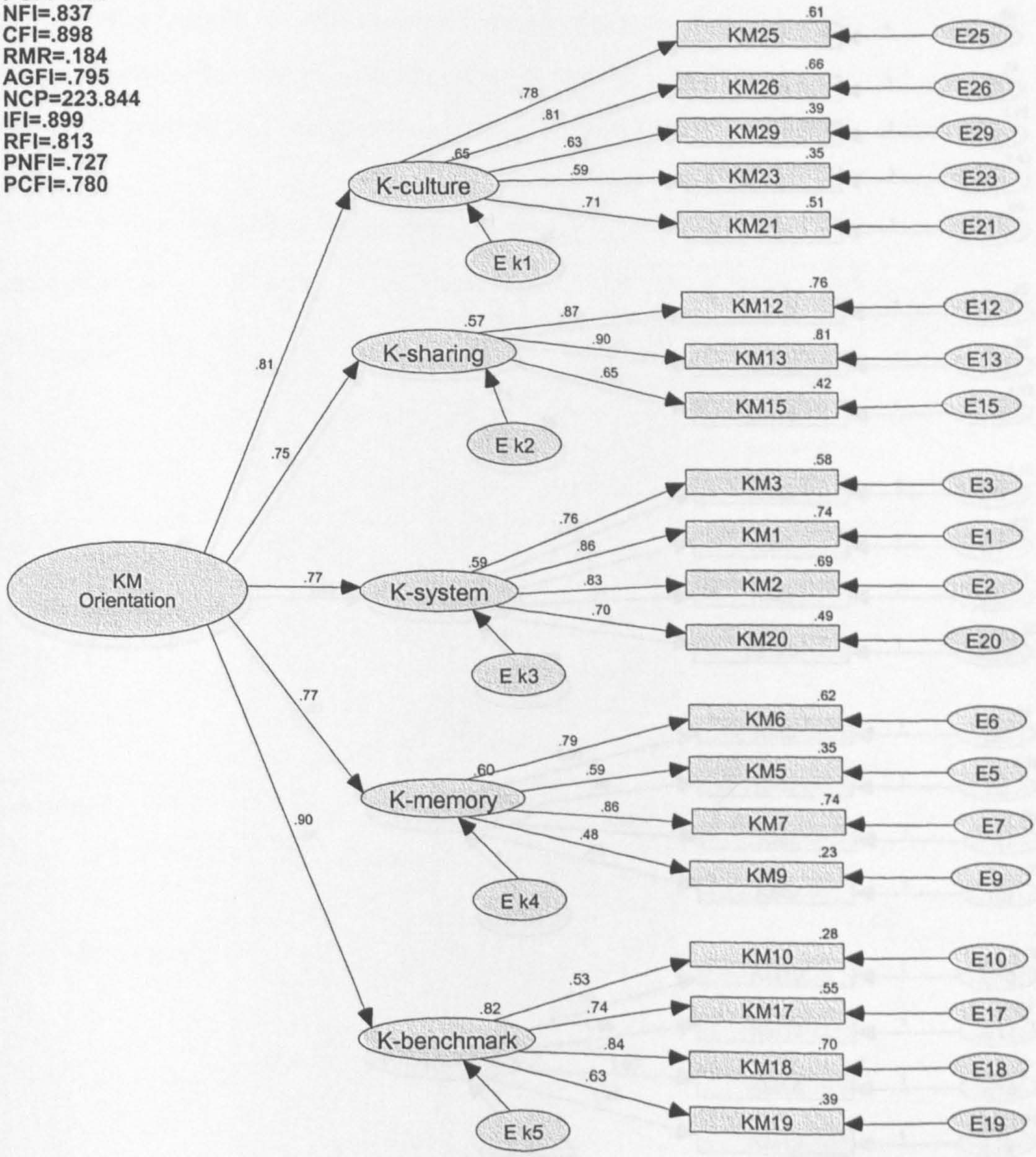
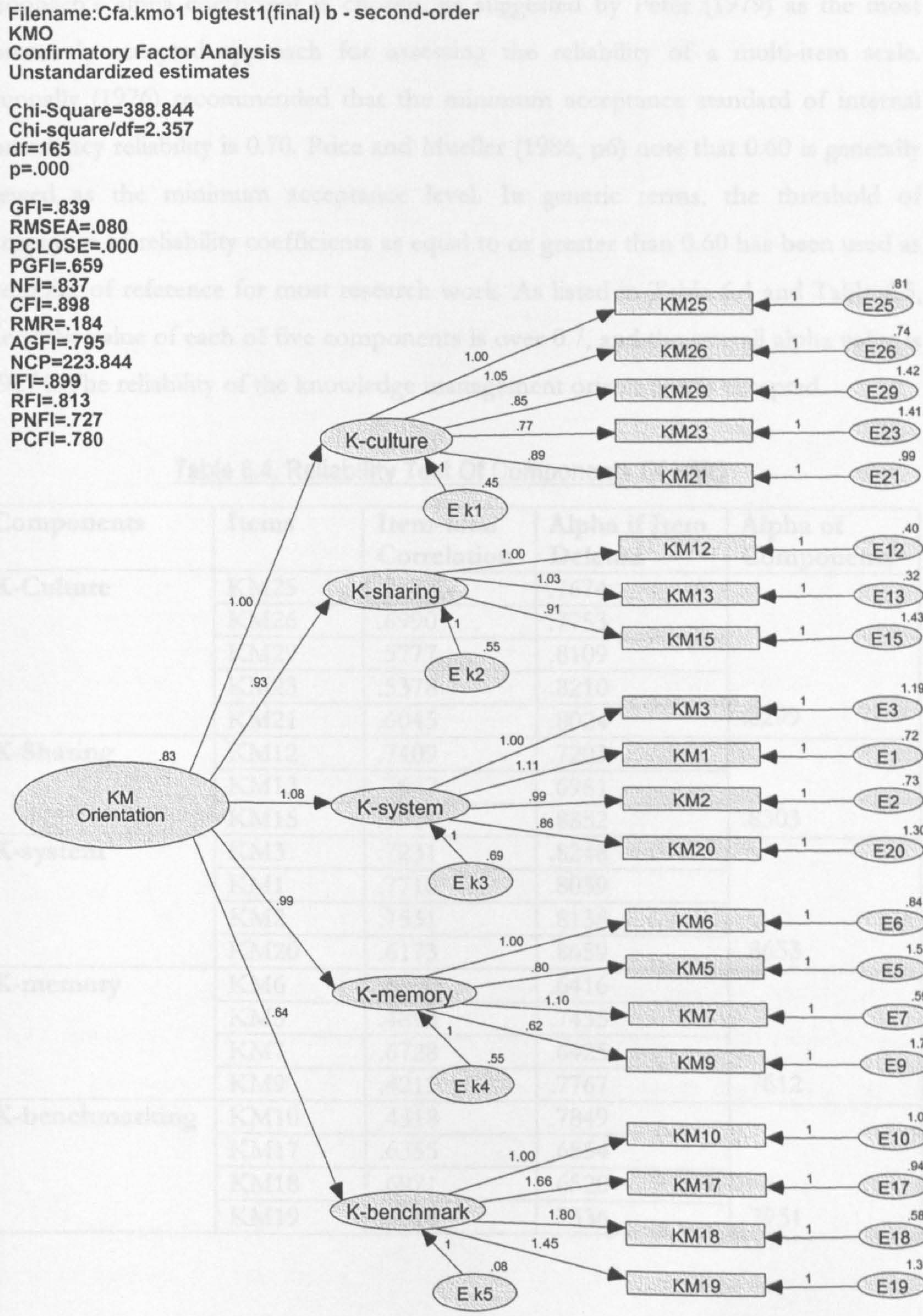


Figure 6.4. KMO-Second-Order CFA (II)



Reliability analysis is performed to test the internal consistency reliability. Cronbach's alpha coefficient is chosen, as suggested by Peter (1979) as the most commonly accepted approach for assessing the reliability of a multi-item scale. Nunnally (1976) recommended that the minimum acceptance standard of internal consistency reliability is 0.70. Price and Mueller (1986, p6) note that 0.60 is generally viewed as the minimum acceptance level. In generic terms, the threshold of acceptance of reliability coefficients as equal to or greater than 0.60 has been used as the point of reference for most research work. As listed in Table 6.4 and Table 6.5, the alpha value of each of five components is over 0.7, and the overall alpha value is 0.9274. The reliability of the knowledge management orientation is accepted.

Table 6.4. Reliability Test Of Components Of KMO

Components	Items	Item-total Correlation	Alpha if Item Deleted	Alpha of Components
K-Culture	KM25	.7272	.7674	
	KM26	.6990	.7753	
	KM29	.5777	.8109	
	KM23	.5378	.8210	
	KM21	.6045	.8024	.8299
K-Sharing	KM12	.7409	.7203	
	KM13	.7647	.6981	
	KM15	.5914	.8852	.8303
K-system	KM3	.7231	.8248	
	KM1	.7718	.8039	
	KM2	.7531	.8138	
	KM20	.6173	.8659	.8653
K-memory	KM6	.6750	.6416	
	KM5	.4893	.7435	
	KM7	.6728	.6425	
	KM9	.4215	.7767	.7612
K-benchmarking	KM10	.4318	.7849	
	KM17	.6355	.6854	
	KM18	.6971	.6520	
	KM19	.5514	.7336	.7731

Table 6.5. Reliability Test Of The KMO Construct

Items	Item-total correlation	Alpha if item deleted	Alpha of the construct
KM25	.5881	.9211	
KM26	.6717	.9194	
KM29	.4802	.9234	
KM23	.5050	.9228	
KM21	.6645	.9196	
KM12	.6518	.9200	
KM13	.6699	.9197	
KM15	.5770	.9214	
KM3	.5361	.9225	
KM1	.6567	.9196	
KM2	.6324	.9201	
KM20	.6684	.9193	
KM6	.5587	.9217	
KM5	.5730	.9215	
KM7	.6673	.9194	
KM9	.4302	.9245	
KM10	.4881	.9230	
KM17	.6322	.9202	
KM18	.7151	.9186	.9247
KM19	.5328	.9223	

6.4 CONFIRMATORY FACTOR ANALYSIS: INNOVOR

As elaborated in Chapter 4, the establishment of the organisational innovativeness construct involves testing of three hypotheses: -

H2.1: Though the organisational innovativeness construct is conceptualised as consisting of five distinct components (i.e. behavioural innovativeness, product innovativeness, process innovativeness, market innovativeness, and strategic innovation), the covariance among the 29 items can be accounted for by a single factor (i.e. a general organisational innovativeness factor).

H2.2: Covariance among the 29 items can be accounted for by a restricted five-factor model wherein each factor represents a particular conceptual component of organisational innovativeness and each item is reflective only of a single component (i.e. loads only on one factor). The five factors are correlated.

H2.3: Responses to each item are reflective of two factors: a general organisational innovativeness factor and a specific component factor corresponding to one of the five conceptual components. Thus the covariance among the items can be accounted for by a six-factor model.

Criteria for assessing all models' fits are the same as those in the confirmatory factor analysis of the knowledge management orientation construct. These include the Chi-square Goodness-of-Fit test statistic, degree of freedom, Chi-square/df, Joreskog and Sorbom's Goodness-of-Fit index (GFI), Ajusted Goodness-of-Fit index (AGFI), the rescaled noncentrality parameter (NCP), Root-Mean-Square Residual (RMR), Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and PCLOSE. The first regression path in each measurement component is fixed at 1.

All 29 items of the organisational innovative orientation construct were initially incorporated into the model testing. The criteria used to evaluate the items are the same as in the confirmatory factor analysis of the knowledge management orientation construct, namely each item's error variance estimate; evidence of items needing to cross-load on more than one component factor as indicated by large modification indices; the extent to which items gave rise to significant residual covariance; parsimony purpose; regression coefficient of each item; reliability of the item and the reliability of the whole construct. Additionally, the logic and consistency of data with the theoretical framework is considered when evaluating each items.

The initial model fit indices were Chi-square=862.079, Chi-square/df=2.349, df=367, GFI=0.776, RMSEA=0.80, PCLOSE=0.000, PGFI=0.654, NFI=0.731, CFI=0.823, RMR=0.158, AGFI=0.734, NCP=495.079. The output of this original model is shown in Appendix 7. These figures showed that the original model needs to be respecified to demonstrate better fit with the sample data. The following modifications are made to improve the model, following the above criteria.

- The initial estimates based on all 29 items show that item 9 and 15 have poor square multiple correlations (0.12 for item 9, and 0.08 for item 15), as well as low regression weights (0.29 for regression of the product factor to item 15, and 0.35 for regression of the market factor to item 9). Both items are thus deleted.

- By examining the error variances, item 21, 13, 12, 18, and 11 are eliminated. Error variance of item 21 is 1.49, item 13 is 1.48, item 12 is 2.05, item 18 is 1.18, and item 11 is 1.44. By eliminating these items, other items are not affected significantly, while the overall goodness-of-fit index improved. Other items that have large error variances, but deleting them would have caused other items to lose effect on the components and overall model fit are retained in the model.

- Modification indices show that item 5 and 6 have large error covariance (38.647). Further assessment of the squared multiple correlation and regression weights of both items show that item 6 had less effect in the construct than item 5. The regression weight for item 6 is 0.74, and 0.78 for item 5; the squared multiple correlation is 0.55 for item 6, and 0.60 for item 5.

- Item 23 of the behavioural innovativeness factor cross loads on to other factors, namely the product factor (M.I.=5.467), the market factor (M.I.=12.470), and the process factor (M.I.=5.198). To avoid cross-loading, and ensure the unidimensionality of factors, item 23 is deleted.

- Item 4 and item 14 have low squared multiple correlation (i.e. 0.18 for both items), and relatively low regression weights (i.e.0.42 for both). However, removing item 4 would have caused other items in the same component to lose their overall effects on the component. The same happened to item 14. Removing either or both items would only improve the model fit indices to a very small extent. Additionally, eliminating item 4 would have weakened the alpha reliability value of the market innovativeness component from 0.6848 to 0.6639. Removing item 14 would have also reduced the alpha reliability value of the strategic innovation component from 0.6311 to 0.6237. For the above reasons, both item 4 and item 14 were retained in the construct.

Following the above steps, 9 items were eliminated in total. The final first-order confirmatory factor analysis model fit indices are: Chi-square statistics=252.453, Chi-square/df=1.578, degree of freedom=160, GFI=0.897, RMSEA=0.052, PCLOSE=0.372, PGFI=0.683, NFI=0.874, CFI=0.949, RMR=0.108, AGFI=0.864, NCP=92.453. The respecified model fits the sample data better. Details of variance, covariance, regression weight and squared multiple correlation are shown in the output of standardised/ unstandardised estimates (see Figure 6.5 and Figure 6.6). Table 6.6 is a summary of the model outputs. From Table 6.6, it is easily noticeable that the regression weights of all variables loading onto their respective factors are between 0.42 and 0.91, with all critical ratios (t-value) above 1.96 (which means that all the regressions are statistically significant at 95% confidence level).

The second-order confirmatory factor analysis is shown in Figure 6.7, Figure 6.8 and Table 6.7, all the first-order five factors load very well onto the second-order Organisational Innovative Orientation factor. The regression weights are very close and range from 0.77 to 0.89, with all critical ratios (t-value) above 1.96. The model fit indices show similar result as the first-order confirmatory factor analysis: Chi-square statistics=306.036, Chi-square/df=1.855, Degree of freedom=165, GFI=0.873, RMSEA=0.63, PCLOSE=0.025, PGFI=0.686, NFI=0.847, CFI=0.922, RMR=0.136, AGFI=0.839, NCP=141.036. The slight difference in the first-order and second-order estimations occurs due to the emergence of slightly different degrees of freedom between executing the first-order and second-order measurement models.

The above statistics show that all the 20 items converge into a single innovative orientation construct. The 20 items are partitioned into five subcomponents: behavioural innovativeness, product innovativeness, process innovativeness, market innovativeness, and strategic innovation. Each of the 20 items is loaded onto only one of these five factors, without any cross-loading. Therefore, convergent validity is established, and accordingly, the unidimenstional representations of the innovative orientation construct are supported.

Table 6.6. Loadings Of First-Order CFA For INNOVOR

Variables	R^2	Standard first-order loadings *				
		Behavioural	Product	Process	Market	Strategic
IN20	.41	.64 ***				
IN25	.58	.76 (9.479)				
IN26	.78	.88 (10.563)				
IN27	.83	.91 (10.770)				
Behavioural **		-	.53	.76	.62	.83
IN05	.57		.75 ***			
IN01	.83		.91 (13.597)			
IN02	.74		.86 (12.875)			
IN07	.33		.57 (8.270)			
Product **			-	.66	.88	.70
IN16	.50			.71 ***		
IN19	.29			.54 (6.812)		
IN29	.40			.63 (7.851)		
IN17	.32			.57 (7.134)		
Process **				-	.69	.74
IN08	.42				.65 ***	
IN03	.32				.56 (7.025)	
IN10	.54				.74 (8.705)	
IN04	.18				.42 (5.409)	
Market **					-	.70
IN14	.18					.42 ***
IN22	.32					.57 (4.993)
IN24	.34					.58 (5.045)
IN28	.40					.63 (5.220)
Strategic **						-
Chi-square statistics=252.453, Chi-square/degree of freedom=1.578, degree of freedom=160, GFI=0.897, RMSEA=0.052, PCLOSE=0.372, PGFI=0.683, NFI=0.874, CFI=0.949, RMR=0.108, AGFI=0.864, NCP=92.453						

* Standard first-order loading is the standard regression weight of the individual variable's loading onto one of the subcomponents. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Standard first-order loading for subcomponents (i.e. behavioural innovativeness, product innovativeness, process innovativeness, market innovativeness, and strategic innovation) is the covariance between any two of these subcomponents.

*** Critical ratio (t-value) is not available, because the regression weight of the first variable of each subcomponent is fixed at 1.

Table 6.7. Loadings Of Second-Order CFA For INNOVOR

Factors	R^2	Standard Second-order loadings *
		Organisational Innovative Orientation
Behavioural innovativeness	.59	.77 **
Product innovativeness	.68	.82 (7.083)
Process innovativeness	.71	.84 (6.761)
Market innovativeness	.80	.89 (6.603)
Strategic innovation	.79	.89 (4.906)
Chi-square statistics=306.036, Chi-square/degree of freedom=1.855, Degree of freedom=165, GFI=0.873, RMSEA=0.63, PCLOSE=0.025, PGFI=0.686, NFI=0.847, CFI=0.922, RMR=0.136, AGFI=0.839, NCP=141.036.		

* Standard second-order loading is the standard regression weight of each of the first-order factor's loading onto the overall innovative orientation construct. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Critical ratio (t-value) is not available, because the regression weight of the first regression weight (i.e. Innovative Orientation → behavioural innovativeness) is fixed at 1.

Figure 6.5. INNOVOR-First-Order CFA (I)

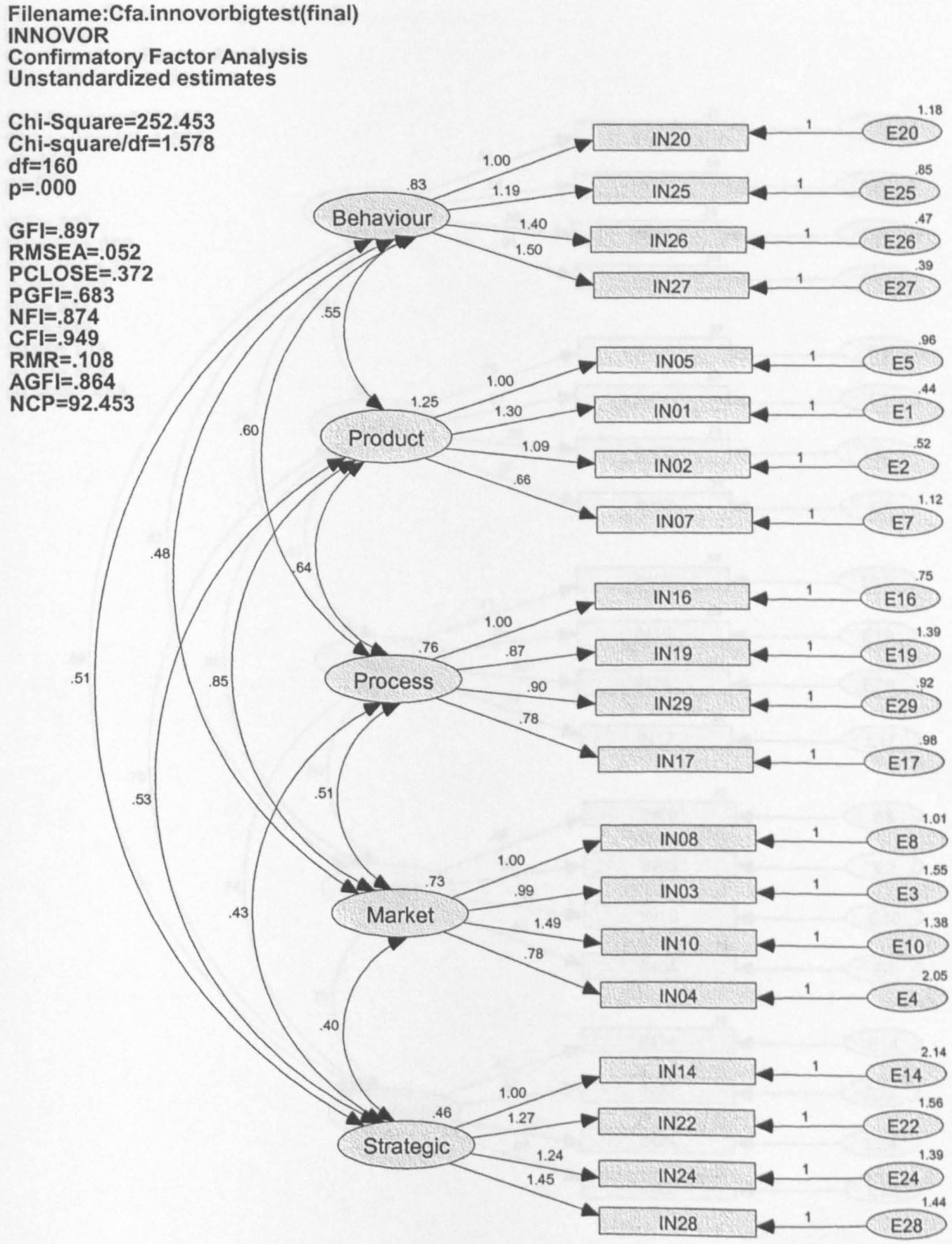


Figure 6.6. INNOVOR-First-Order CFA (II)

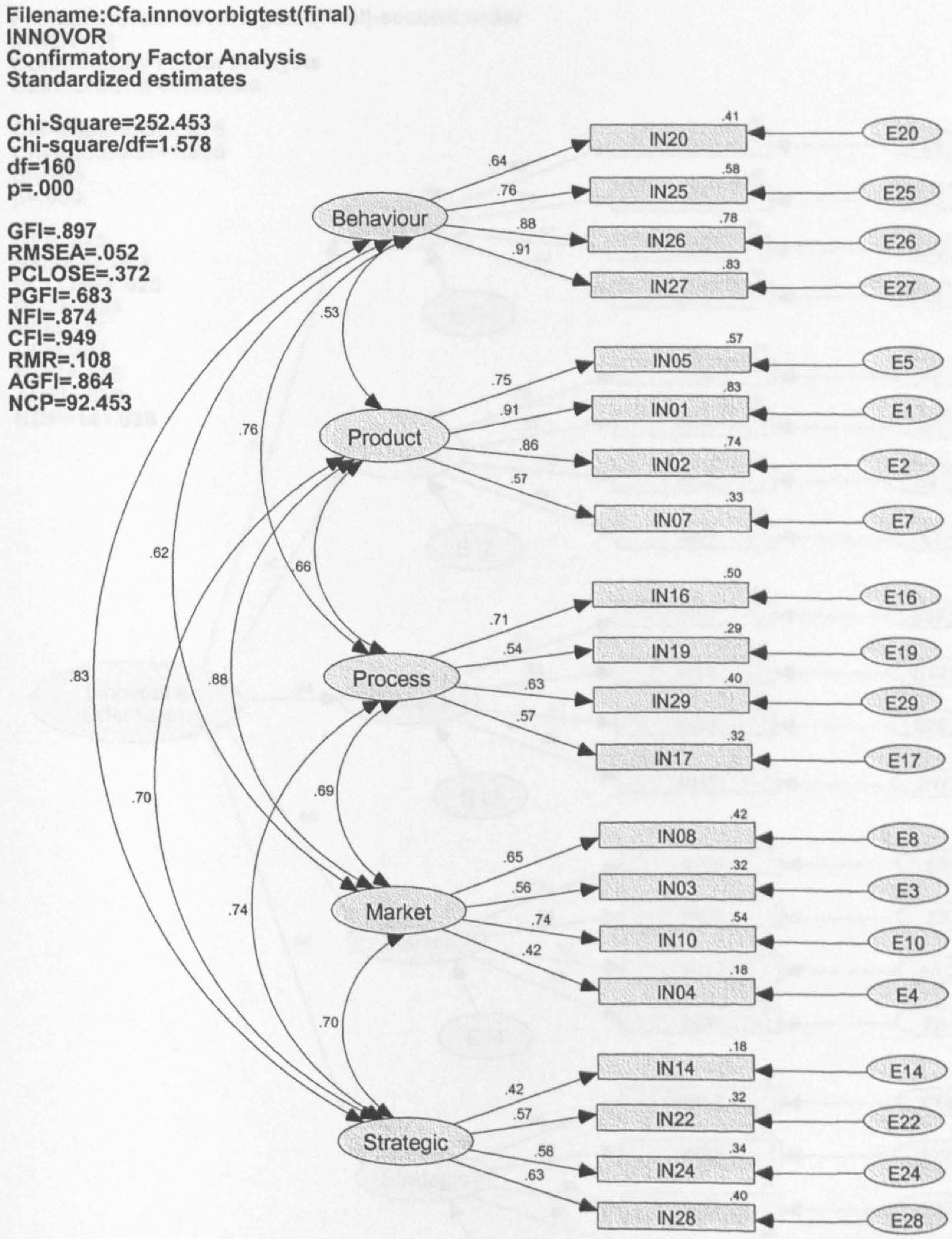


Figure 6.7 INNOVOR-Second-Order CFA (I)

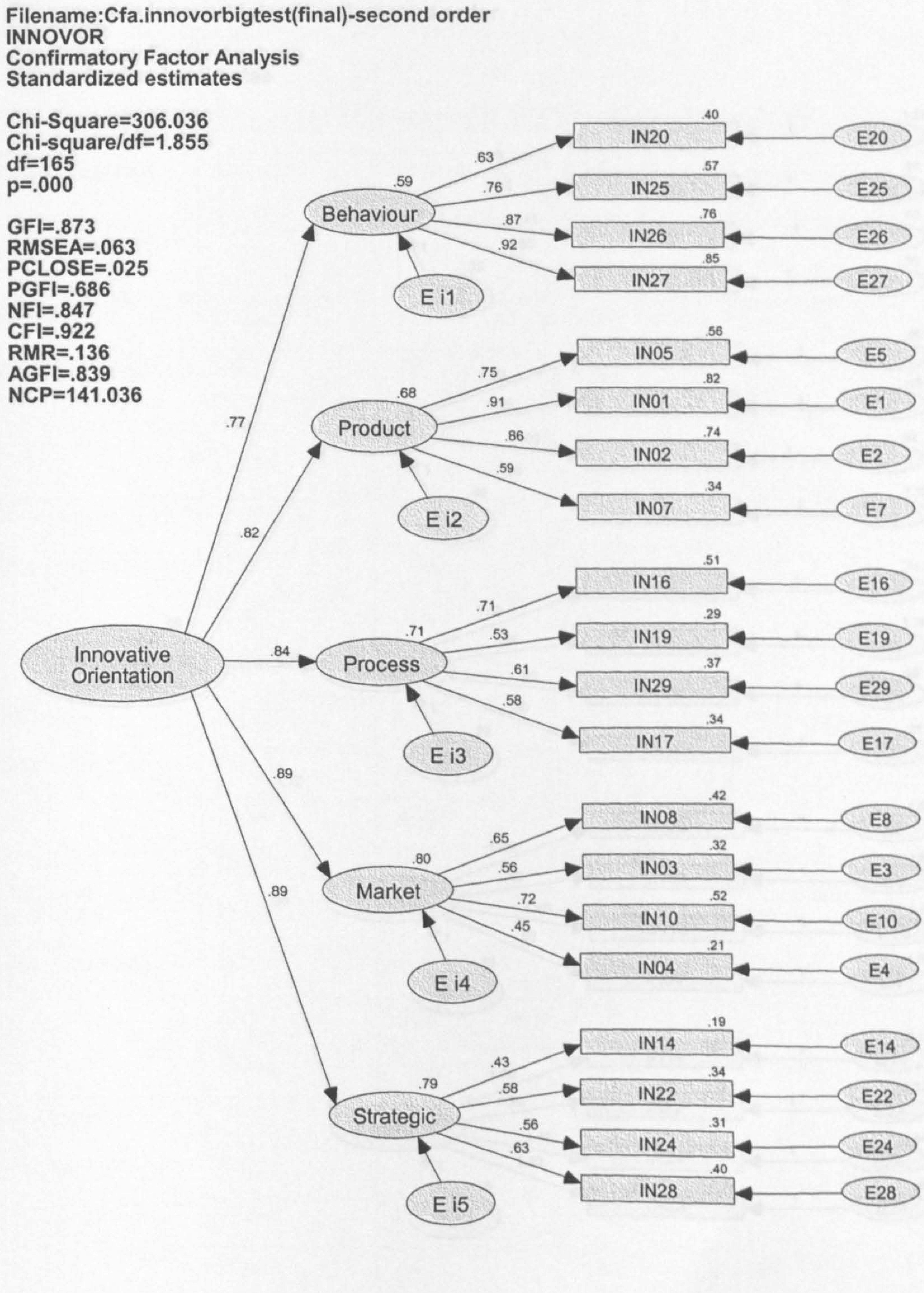
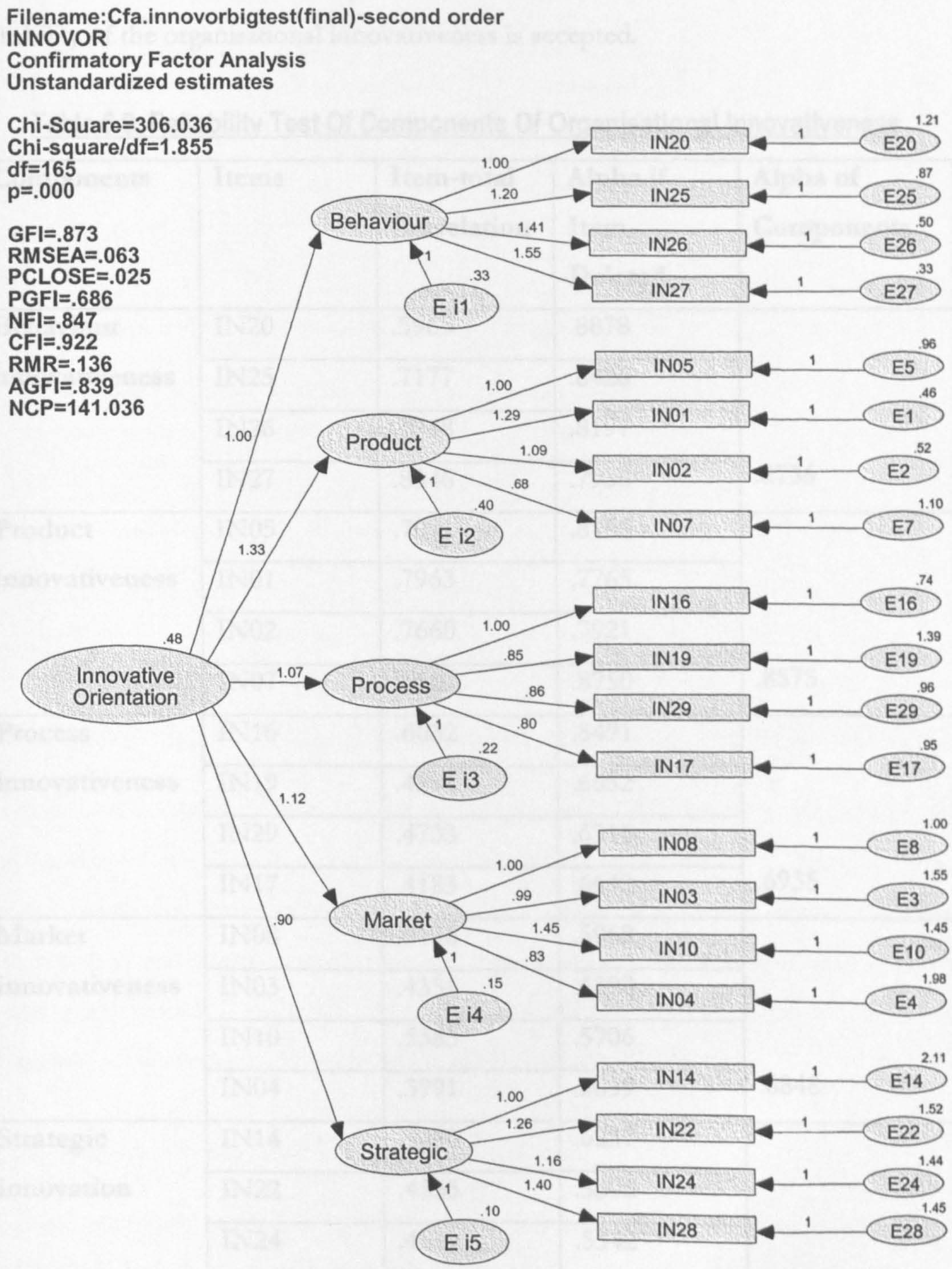


Figure 6.8. INNOVOR-Second-Order CFA (II)



Cronbach's coefficient alpha is calculated to test the internal consistency reliability. The alpha value of each of the five components as shown in Table 6.8 are equal to or greater than 0.60. The overall alpha value of 20 items is 0.9091 (see Table 6.9). The reliability of the organisational innovativeness is accepted.

Table 6.8. Reliability Test Of Components Of Organisational Innovativeness

Components	Items	Item-total Correlation	Alpha if Item Deleted	Alpha of Components
Behaviour innovativeness	IN20	.5965	.8878	
	IN25	.7177	.8426	
	IN26	.7748	.8197	
	IN27	.8346	.7936	.8736
Product innovativeness	IN05	.7081	.8158	
	IN01	.7963	.7765	
	IN02	.7660	.7921	
	IN07	.5503	.8750	.8575
Process innovativeness	IN16	.6032	.5491	
	IN19	.4291	.6652	
	IN29	.4733	.6316	
	IN17	.4183	.6642	.6935
Market innovativeness	IN08	.5176	.5969	
	IN03	.4351	.6398	
	IN10	.5385	.5706	
	IN04	.3991	.6639	.6848
Strategic innovation	IN14	.3280	.6237	
	IN22	.4535	.5308	
	IN24	.4519	.5342	
	IN28	.4177	.5566	.6311

Table 6.9. Reliability Test Of The Organisational Innovativeness Construct

Items	Item-total correlation	Alpha if item deleted	Alpha of the construct
IN20	.5693	.9043	
IN25	.5508	.9048	
IN26	.7317	.9002	
IN27	.7194	.9004	
IN05	.6139	.9032	
IN01	.7183	.9002	
IN02	.6842	.9015	
IN07	.5217	.9055	
IN16	.5784	.9044	
IN19	.4460	.9073	
IN29	.5090	.9058	
IN17	.5054	.9059	
IN08	.5450	.9050	
IN03	.4901	.9063	
IN10	.5968	.9037	
IN04	.3612	.9099	
IN14	.3752	.9096	
IN22	.4901	.9064	
IN24	.4820	.9065	
IN28	.5636	.9045	.9091

6.5 MEASUREMENT MODELS OF MARKOR, LEARNOR, AND PERFORMANCE

As discussed in Chapter 3 and Chapter 4, Kohli et al's (1993) market orientation scale and Sinkula et al's (1997) organisational learning scale are adopted. Because these scales are already established and empirically tested by many researchers, this research does not intend to modify either of these scales. The results of confirmatory factor analysis and Cronbach's alpha tests for both scales are reported here for references of adopting both scales in the further structural analysis.

6.5.1 Market Orientation

The measurement scale of market orientation consists of 20 items, which are partitioned into three factors, namely intelligence generation (6 items), intelligence dissemination (5 items), and responsiveness (9 items). A confirmatory factor analysis is performed (the first regression path in each measurement component is fixed at 1), and the results of the model fit indices are: Chi-square statistics=411.883, Chi-square/df=2.466, degree of freedom=167, GFI=0.829, RMSEA=0.083,

PCLOSE=0.000, PGFI=0.659, NFI=0.780, CFI=0.855, RMR=0.166, AGFI=0.785, NCP=244.883 (see Figure 6.9 and Figure 6.10). Table 6.10 shows the comparison of the confirmatory factor analysis conducted in this research and the original confirmatory factor analysis by Kohli et al (1993). The comparison is based on the summary results of single-informant sample stage analysis of Kohli et al (1993), whereas the model chosen for this comparison is the adjusted 20-item MOD4: one general factor + 3 correlated market orientation components factors (Kohli et al, 1993, p470).

Table 6.10. Comparison Of MARKOR Model Fit

	χ^2	χ^2 /df	df	GFI
Kohli et al	223.35	1.522	147	.875
This research	411.88	2.466	167	.829

The regression weight for each variable loading onto its respective factor is between 0.33 and 0.73, with critical ratios (t-value) above 1.96 (see Table 6.11). To be consistent with data analysis of measurement models for knowledge management orientation and innovative orientation, a second-order confirmatory factor analysis for market orientation is conducted. As shown in Figure 6.11and Figure 6.12 and Table 6.12, all the first-order three factors load very well onto the second-order market orientation factor. The regression weights range from 0.85 to 1.02, with all critical ratios (t-value) above 1.96. The model fit indices show exactly the same result as the first-order confirmatory factor analysis.

The above statistics show that all the 20 items converge into a single market orientation factor. The 20 items are partitioned into three subcomponents: intelligence generation, intelligence dissemination, and responsiveness. Each of the 20 items is loaded onto only one of these three factors, without any cross-loading. Therefore, convergent validity is established, and accordingly, the unidimensional representation of the market orientation construct is supported.

Table 6.11. Loadings Of First-Order CFA For MARKOR

Variables	R^2	Standardised First-Order Loadings*		
		Intelligence generation	Intelligence dissemination	Responsiveness
IG1	.29	.54 ***		
IG2	.45	.67 (6.889)		
IG3	.51	.72 (7.129)		
IG4	.11	.33 (4.126)		
IG5	.44	.67 (6.852)		
IG6	.32	.56 (6.162)		
Intelligence generation**		-	.78	.87
ID7	.49		.70 ***	
ID8	.53		.73 (9.620)	
ID9	.41		.64 (8.586)	
ID10	.31		.56 (7.534)	
ID11	.48		.69 (9.174)	
Intelligence dissemination**			-	.94
RP12	.31			.55 ***
RP13	.53			.73 (7.808)
RP14	.39			.62 (7.055)
RP15	.43			.66 (7.325)
RP16	.24			.49 (5.993)
RP17	.54			.73 (7.820)
RP18	.26			.51 (6.167)
RP19	.43			.66 (7.323)
RP20	.43			.66 (7.328)
Responsiveness **				-
Chi-square statistics=411.883, Chi-square/degree of freedom=2.466, degree of freedom=167, GFI=0.829, RMSEA=0.083, PCLOSE=0.000, PGFI=0.659, NFI=0.780, CFI=0.855, RMR=0.166, AGFI=0.785, NCP=244.883				

* Standard first-order loading is the standard regression weight of the individual variable's loading onto one of the subcomponents. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Standard first-order loading for subcomponents (i.e. intelligence generation, intelligence dissemination, and responsiveness) is the covariance between any two of these subcomponents.

*** Critical ratio (t-value) is not available, because the regression weight of the first variable of each subcomponent is fixed at 1.

Table 6.12. Loadings Of Second-Order Confirmatory Factor Analysis For Innovative Orientation

Factors	R^2	Standard Second-order loadings *
		Market Orientation
Intelligence generation	.72	.85 **
Intelligence dissemination	.84	.92 (6.544)
Responsiveness	1.04	1.02 (5.827)
Chi-square statistics=411.883, Chi-square/degree of freedom=2.466, degree of freedom=167, GFI=0.829, RMSEA=0.083, PCLOSE=0.000, PGFI=0.659, NFI=0.780, CFI=0.855, RMR=0.166, AGFI=0.785, NCP=244.883		

* Standard second-order loading is the standard regression weight of each of the first-order factor's loading onto the overall market orientation construct. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Critical ratio (t-value) is not available, because the regression weight of the first regression weight (i.e. Market orientation → Intelligence generation) is fixed at 1.

Figure 6.9. MARKOR-First-Order CFA (I)

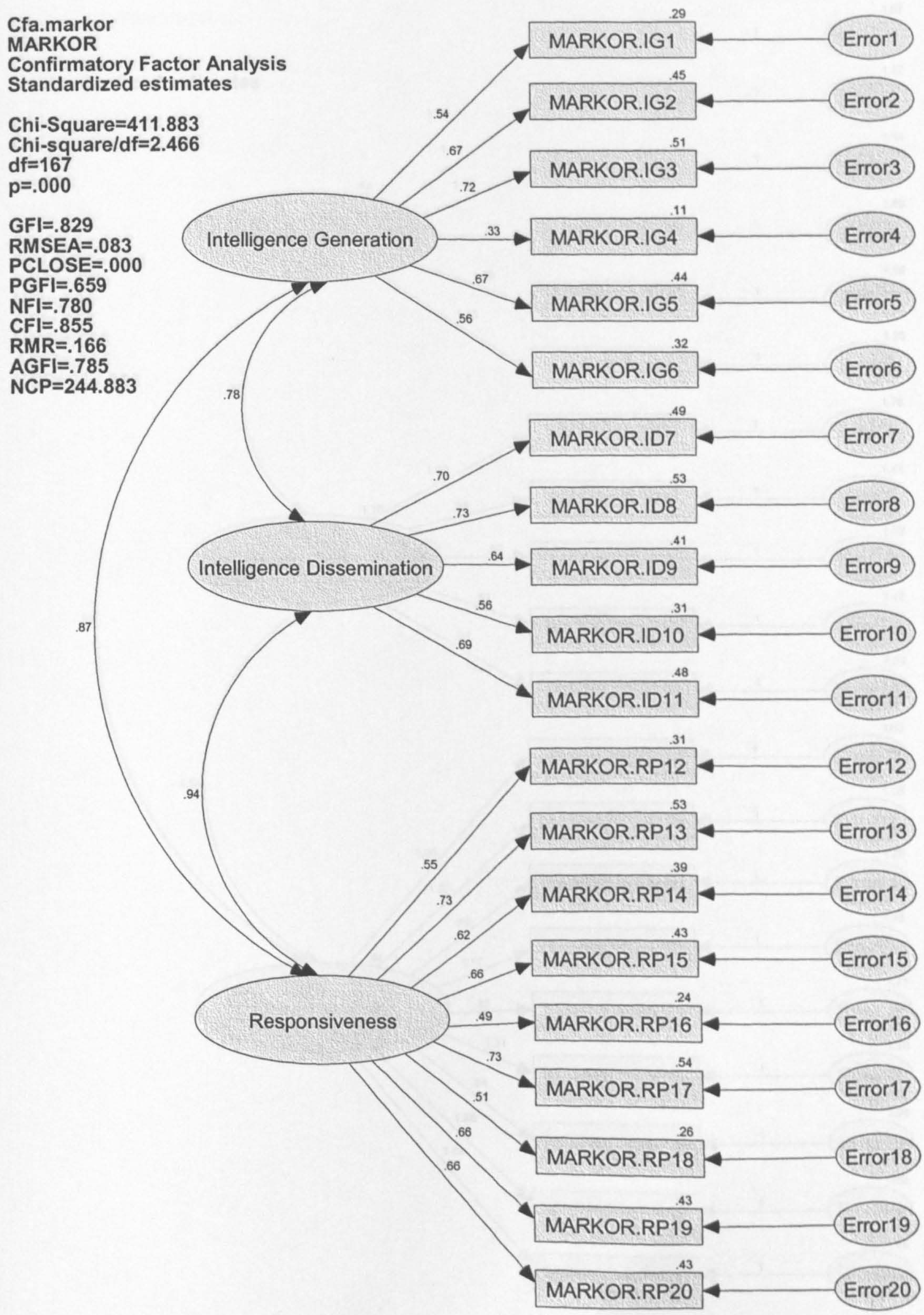


Figure 6.10. MARKOR-First-Order CFA (II)

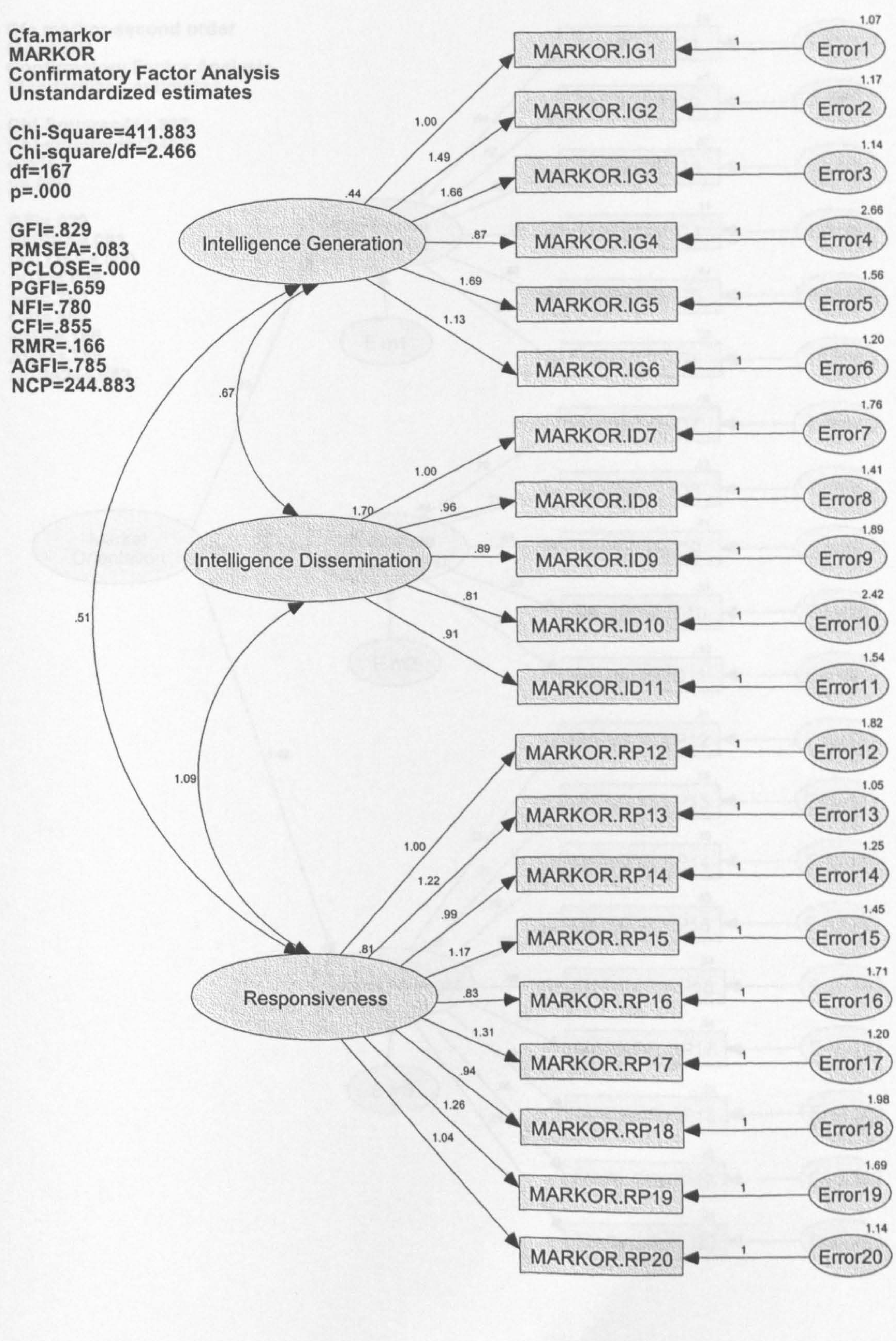


Figure 6.11. MARKOR-Second-Order CFA (I)

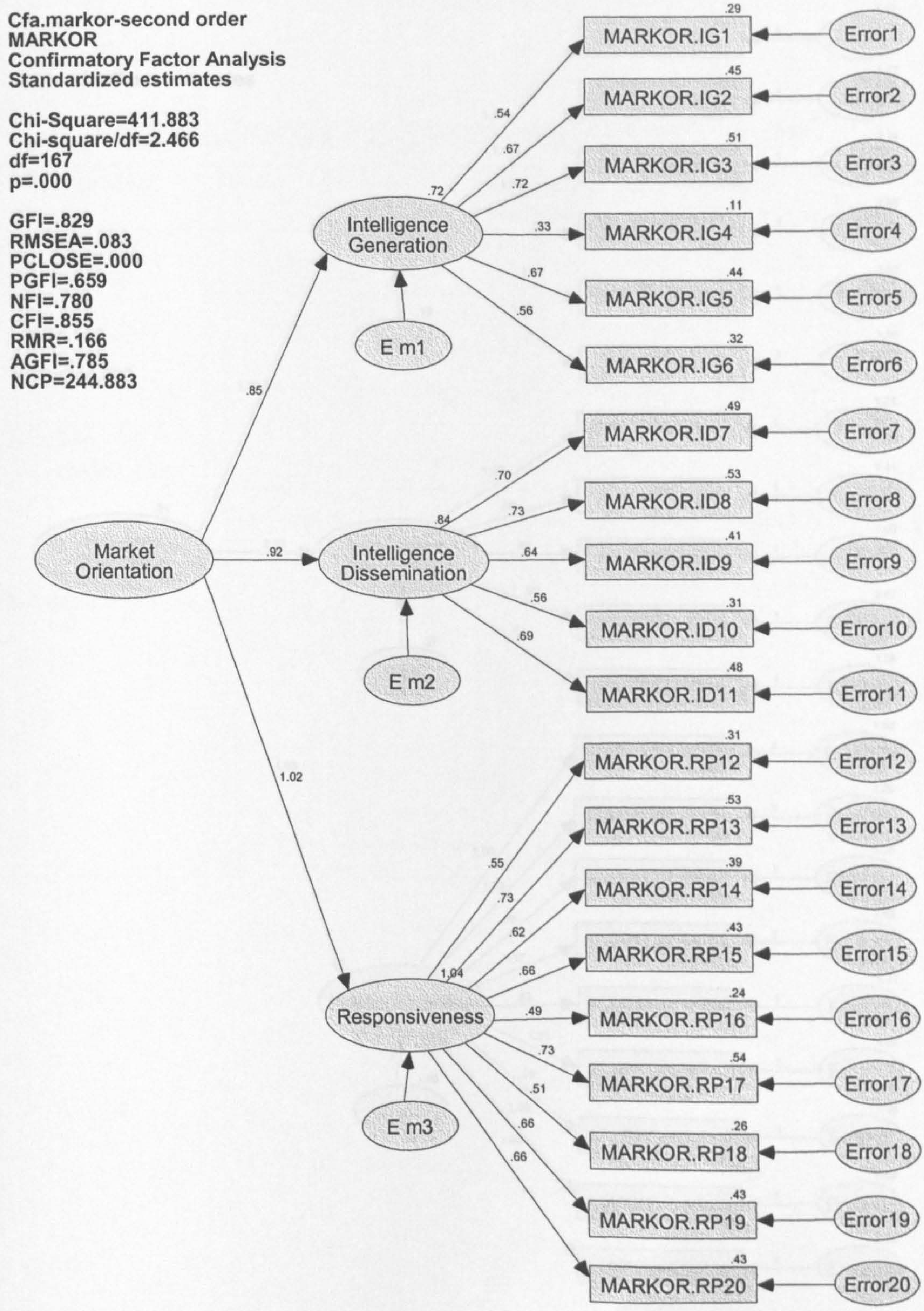
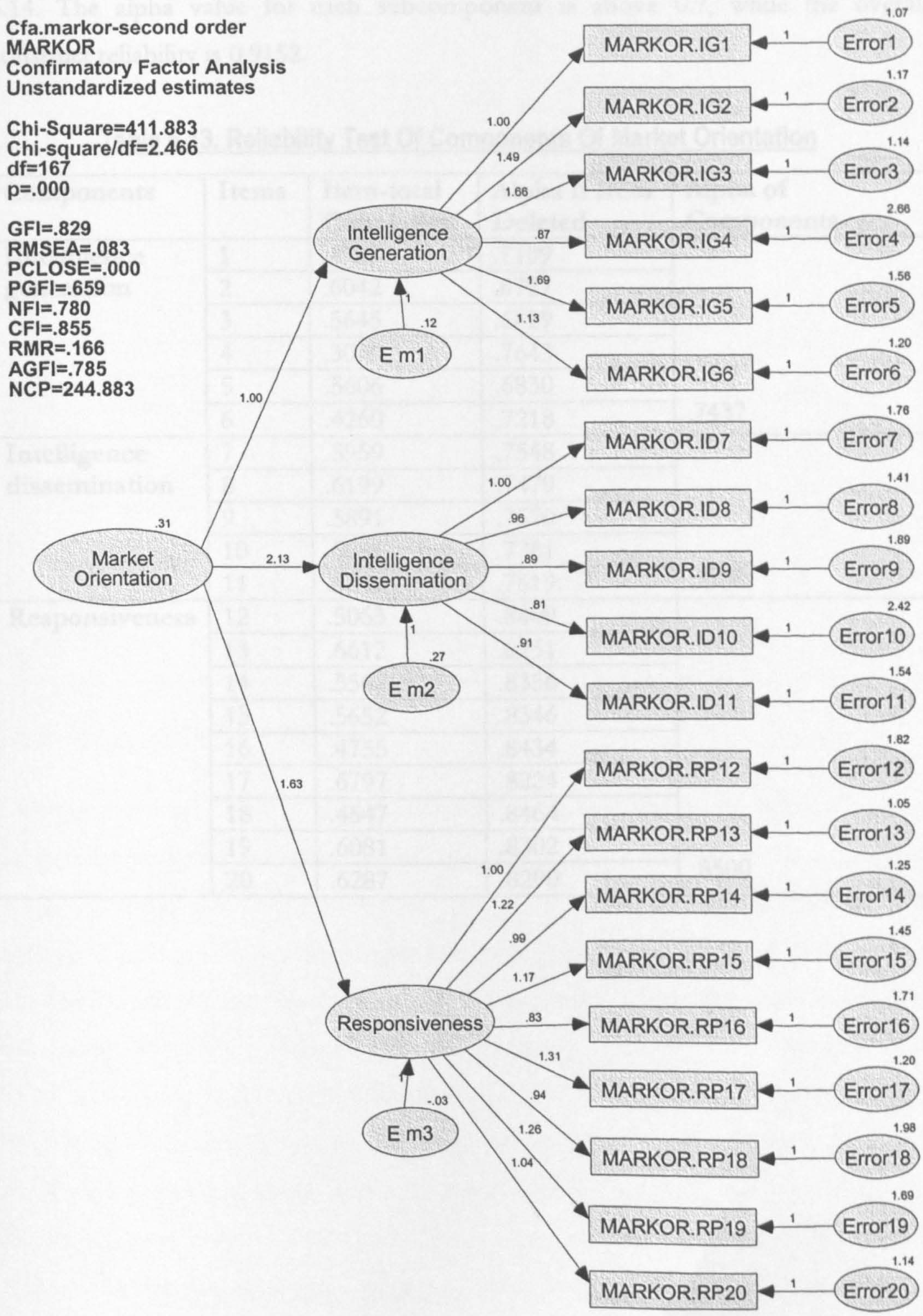


Figure 6.12. MARKOR-Second-Order CFA (II)



Cronbach's reliability test is performed for the overall construct as well as each of the three components. These are reported in the following Table 6.13 and Table 6.14. The alpha value for each subcomponent is above 0.7, while the overall construct reliability is 0.9152.

Table 6.13. Reliability Test Of Components Of Market Orientation

Components	Items	Item-total Correlation	Alpha if Item Deleted	Alpha of Components
Intelligence generation	1	.4783	.7109	
	2	.6042	.6727	
	3	.5645	.6829	
	4	.3039	.7643	
	5	.5606	.6830	
	6	.4260	.7218	.7437
Intelligence dissemination	7	.5959	.7548	
	8	.6199	.7479	
	9	.5891	.7570	
	10	.5251	.7781	
	11	.5741	.7619	.7983
Responsiveness	12	.5063	.8409	
	13	.6612	.8251	
	14	.5569	.8356	
	15	.5652	.8346	
	16	.4755	.8434	
	17	.6797	.8224	
	18	.4547	.8464	
	19	.6081	.8302	
	20	.6287	.8290	.8500

Table 6.14. Reliability Test Of The Market Orientation Construct

Items	Item-total correlation	Alpha if item deleted	Alpha of the construct
1	.4999	.9127	
2	.5856	.9108	
3	.6043	.9103	
4	.3145	.9174	
5	.5295	.9120	
6	.5316	.9120	
7	.6315	.9095	
8	.6524	.9090	
9	.5957	.9104	
10	.5235	.9125	
11	.6360	.9094	
12	.5130	.9124	
13	.7007	.9082	
14	.5895	.9107	
15	.6184	.9099	
16	.4614	.9134	
17	.6763	.9085	
18	.4944	.9128	
19	.5997	.9103	
20	.6248	.9100	.9152

6.5.2 Organisational Learning

The measurement scale of organisational learning consists of 11 items which are partitioned into three factors, namely commitment to learning (4 items), shared vision (4 items), and open-mindedness (3 items). A first-order confirmatory factor analysis is performed (the first regression path in each measurement component is fixed at 1), and the results of the model fit indices are: Chi-square statistics=99.637, Chi-square/df=2.430, degree of freedom=41, GFI=0.923, RMSEA=0.082, PCLOSE=0.006, PGFI=0.574, NFI=0.925, CFI=0.954, RMR=0.093, AGFI=0.876, NCP=58.637. Details of variance, covariance, regression weight and squared multiple correlation are shown in the output of standardised / unstandardised estimates (see Figure 6.13 and Figure 6.14). Table 6.16 is a summary of the model outputs. Table 6.16 shows that the regression weights of all variables loading onto their respective factors are between 0.43 and 0.89, with all critical ratios (t-value) above 1.96 (which means that all the regressions are statistically significant at 95% confidence level).

The second-order confirmatory factor analysis, as shown in Figure 6.15 and Figure 6.16 and Table 6.17, indicates that all the first-order three factors load very well onto the second-order Learning Orientation construct. The regression weights range from 0.75 to 0.94, with all critical ratios (t-value) above 1.96. The model fit indices are the same as the first-order confirmatory factor analysis. Sinkula et al (1997) report their second-order model fit indices as χ^2=51.15, χ^2/df=1.248, df=41, CFI=.99, and NFI=.98. Table 6.15 is a comparison with the second-order confirmatory model fit indices of this research.

Table 6.15. Comparison Of Model Fit Of The Learning Orientation Scale

	χ^2	χ^2/df	df	CFI	NFI
Sinkula et al	51.15	1.248	41	.99	.98
This research	99.637	2.430	41	.95	.93

The above statistics show that all the 11 items converge into a single Learning Orientation construct. The 11items are partitioned into three subcomponents: commitment to learning, shared vision and open-mindedness. Each of the 11items is loaded onto only one of these three factors, without any cross-loading. Therefore, convergent validity is established, and accordingly, the unidimensional representation of the Learning Orientation construct is supported.

Table 6.16. Loadings Of First-Order CFA For LEARNOR

Variables	R^2	Standardised First-Order Loadings*		
		Commitment to learning	Shared vision	Open-mindedness
CM1	.45	.67 ***		
CM2	.64	.80 (10.355)		
CM3	.78	.88 (11.186)		
CM4	.79	.89 (11.235)		
Commitment to learning**		-	.70	.64
SV5	.57		.75 ***	
SV6	.54		.73 (10.681)	
SV7	.67		.82 (12.007)	
SV8	.76		.87 (12.801)	
Shared vision **			-	.80
OP9	.45			.67 ***
OP10	.56			.75 (8.169)
OP11	.18			.43 (5.299)
Open-mindedness **				-
Chi-square statistics=99.637, Chi-square/degree of freedom=2.430, degree of freedom=41, GFI=0.923, RMSEA=0.082, PCLOSE=0.006, PGFI=0.574, NFI=0.925, CFI=0.954, RMR=0.093, AGFI=0.876, NCP=58.637				

* Standard first-order loading is the standard regression weight of the individual variable's loading onto one of the subcomponents. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Standard first-order loadings for subcomponents (i.e. commitment to learning, shared vision, and open-mindedness) is the covariance between any two of these subcomponents.

*** Critical ratio (t-value) is not available, because the regression weight of the first variable of each subcomponent is fixed at 1.

Table 6.17. Loadings Of Second-Order CFA For LEARNOR

Factors	R^2	Standard Second-order loadings *
		Learning Orientation
Commitment to learning	.56	.75**
Shared vision	.88	.94 (6.907)
Open-mindedness	.72	.85 (6.541)
Chi-square statistics=99.637, Chi-square/degree of freedom=2.430, degree of freedom=41, GFI=0.923, RMSEA=0.082, PCLOSE=0.006, PGFI=0.574, NFI=0.925, CFI=0.954, RMR=0.093, AGFI=0.876, NCP=58.637		

* Standard second-order loading is the standard regression weight of each of the first-order factor's loading onto the overall learning orientation construct. Figures in parentheses are critical ratio (t-value) from the unstandardised solutions.

** Critical ratio (t-value) is not available, because the regression weight of the first regression weight (i.e. Learning Orientation → commitment to learning) is fixed at 1.

Figure 6.13. LEARNOR-First-Order CFA (I)

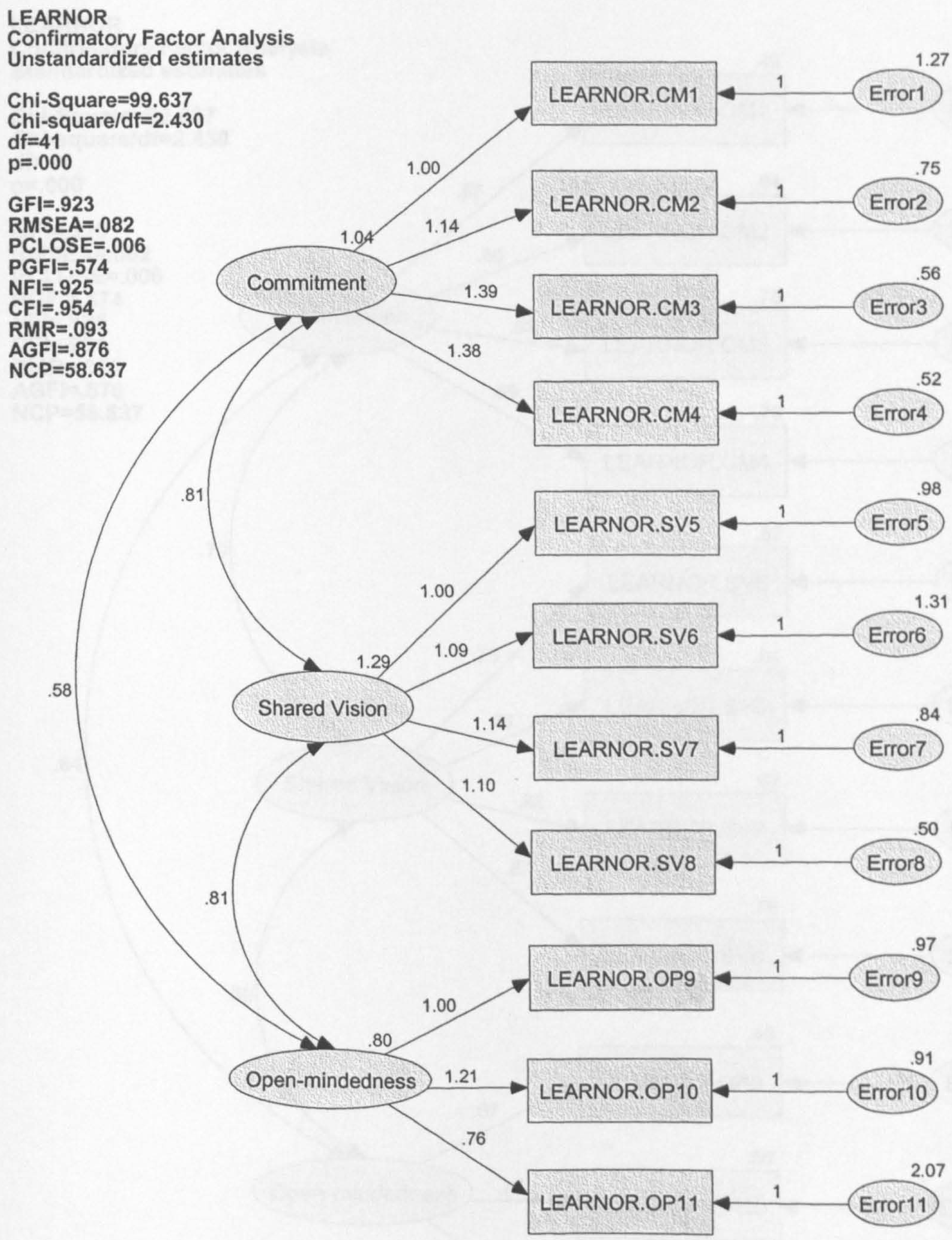


Figure 6.14. LEARNOR-First-Order CFA (II)

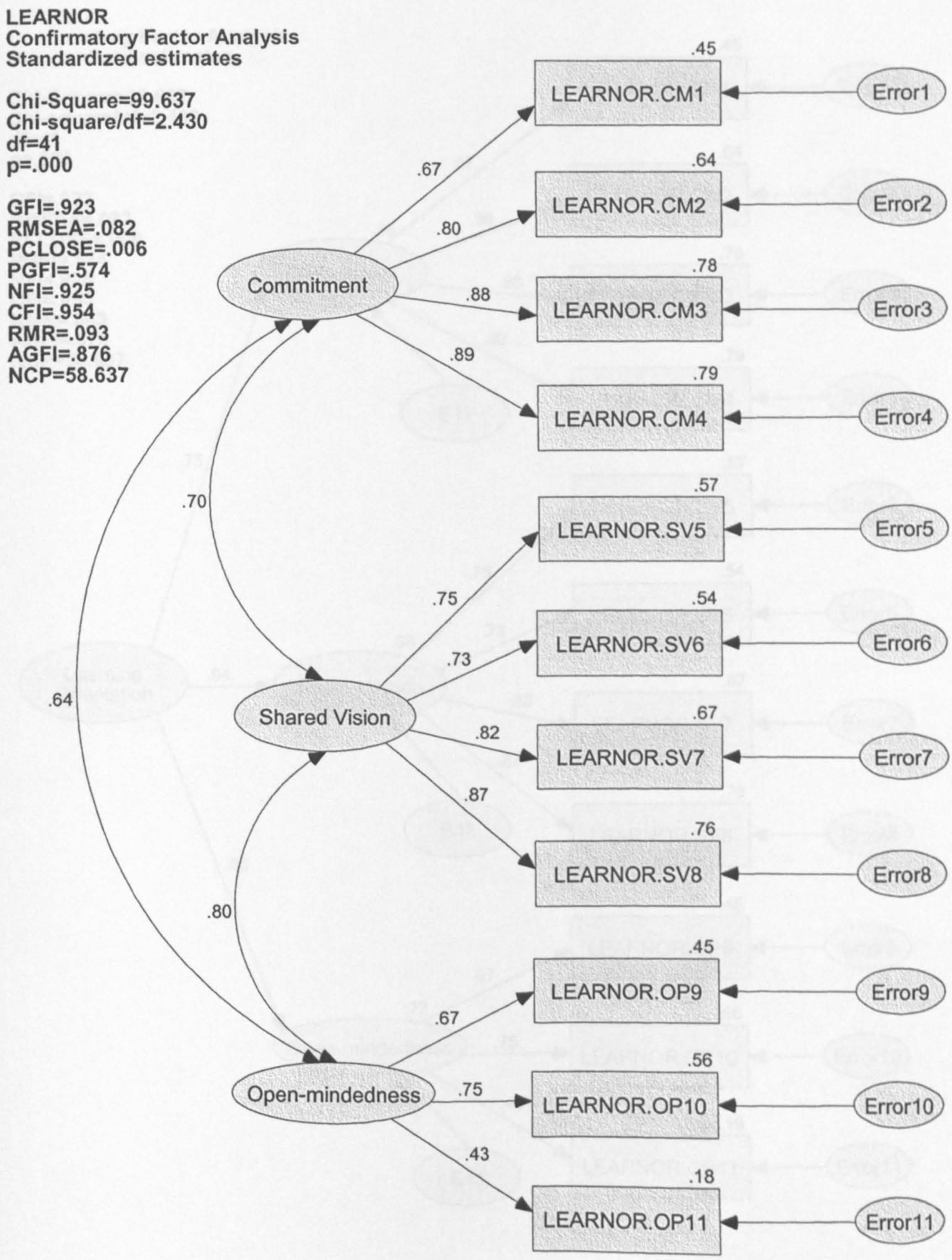


Figure 6.15. LEARNOR-Second-Order CFA (I)

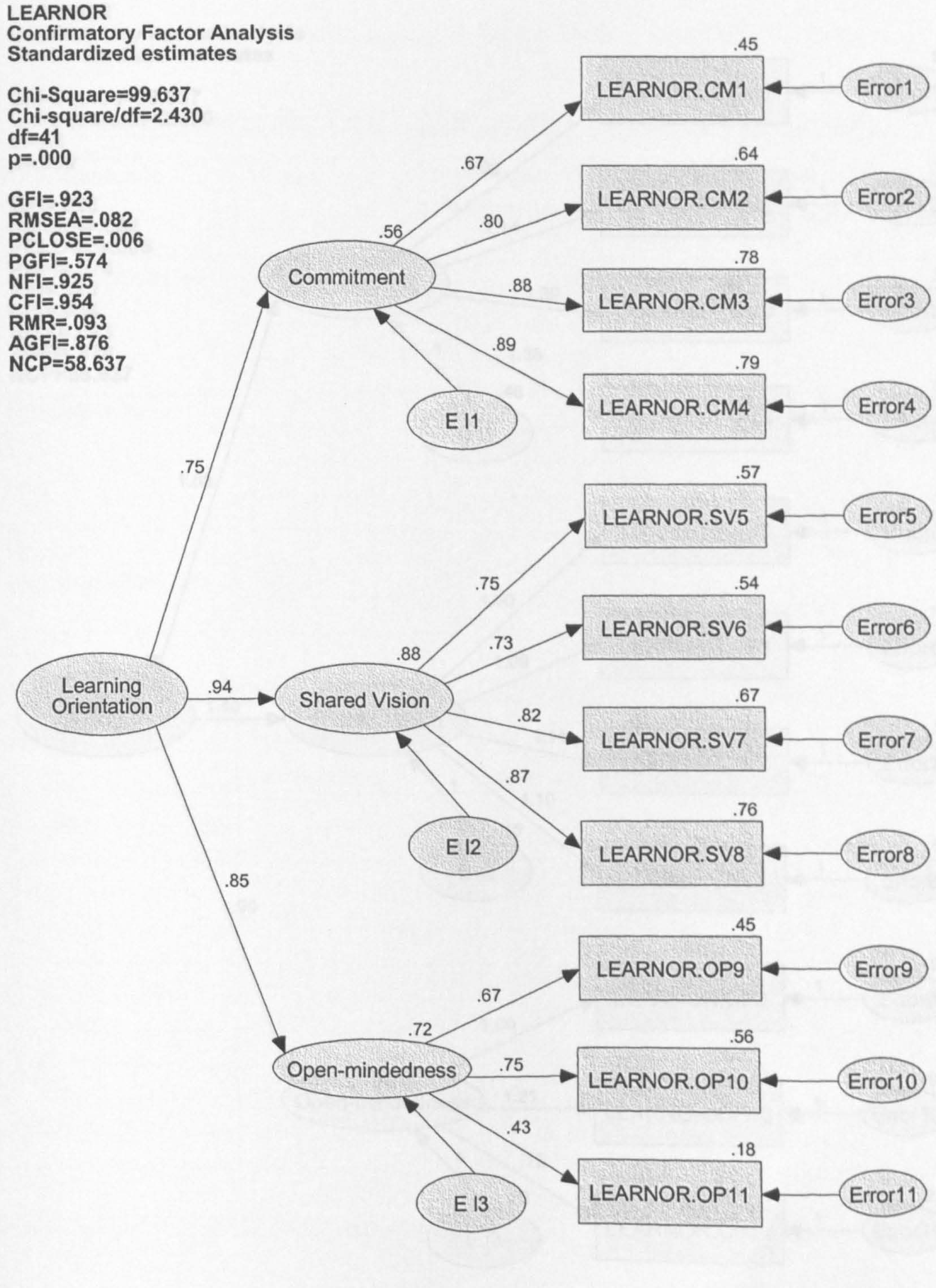
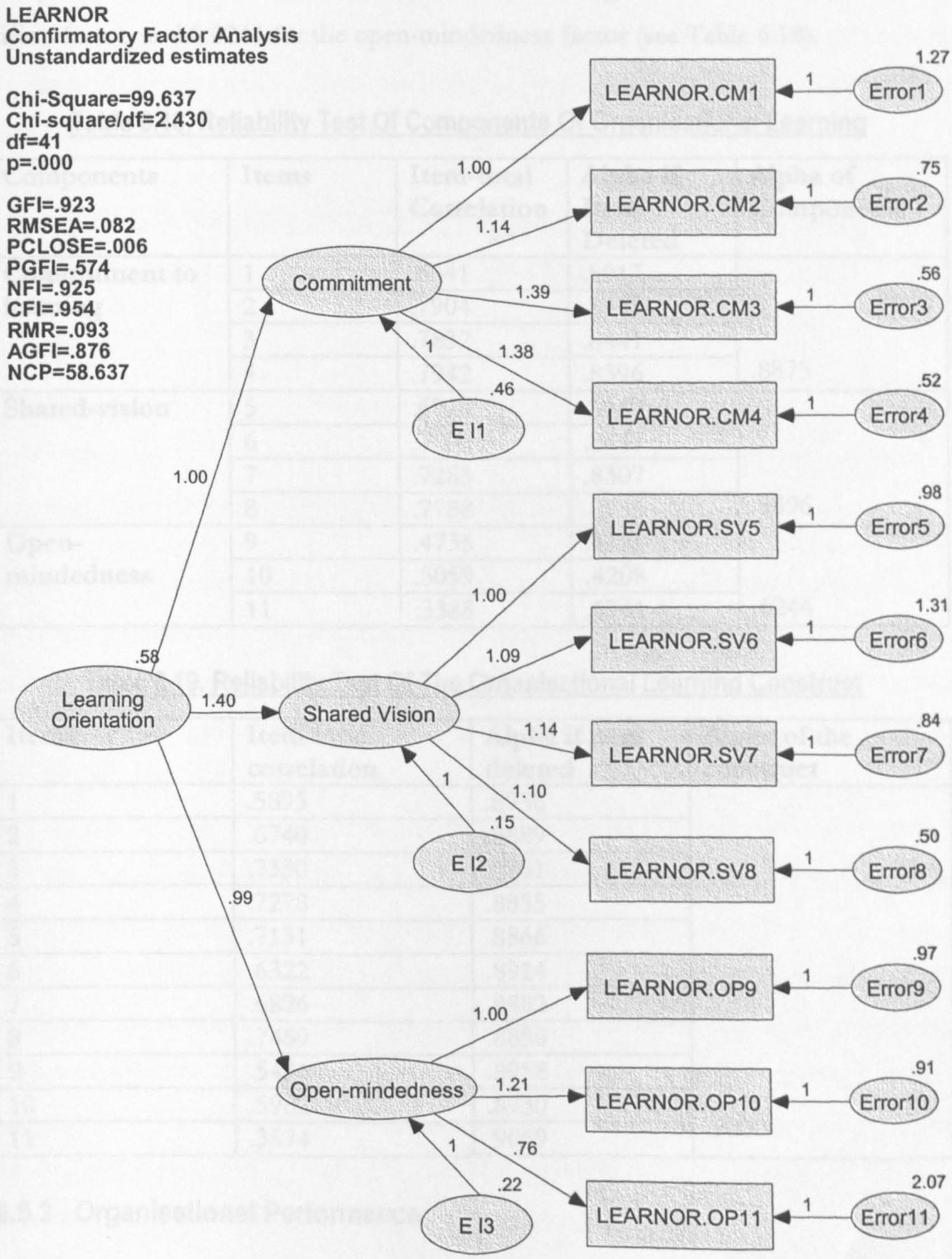


Figure 6.16. LEARNOR-Second-Order CFA (II)



Cronbach's reliability test shows that the overall organisational learning construct has an alpha value of 0.9000 (see Table 6.19). The alpha values for the three components are 0.8875 for the commitment to learning factor, 0.8696 for the shared vision factor, and 0.6244 for the open-mindedness factor (see Table 6.18).

Table 6.18. Reliability Test Of Components Of Organisational Learning

Components	Items	Item-total Correlation	Alpha if Item Deleted	Alpha of Components
Commitment to learning	1	.6541	.8917	
	2	.7904	.8429	
	3	.7832	.8441	
	4	.7942	.8396	.8875
Shared-vision	5	.6924	.8449	
	6	.7001	.8447	
	7	.7283	.8307	
	8	.7788	.8135	.8696
Open-mindedness	9	.4735	.4781	
	10	.5059	.4208	
	11	.3385	.6741	.6244

Table 6.19. Reliability Test Of The Organisational Learning Construct

Items	Item-total correlation	Alpha if item deleted	Alpha of the construct
1	.5895	.8936	
2	.6740	.8889	
3	.7330	.8851	
4	.7278	.8855	
5	.7131	.8866	
6	.6322	.8914	
7	.6826	.8882	
8	.7469	.8850	
9	.5436	.8958	
10	.5982	.8930	
11	.3574	.9069	.9000

6.5.3 Organisational Performance

The organisational performance construct consists of two variables. In this two-item measurement model, there are three sample moments, but four parameters need to be estimated. To achieve an overidentified model, at least one degree of freedom is required. Therefore at least two constraints need to be made on this model in order to be overidentified. Therefore, confirmatory factor analysis cannot be undertaken for the organisational performance construct, because of the lack of sample moments, which led to the negative number of degree of freedom. Cronbach's reliability test is performed, and the construct consisting of two items, namely return on capital employed and earnings per share, has an overall alpha value of 0.7980 (see Table 6.20).

Table 6.20. Reliability Test Of The Organisational Performance Construct

Items	Item-total correlation	Alpha if item deleted	Alpha of the construct
1	.6647		.7980
2	.6647		

6.6 RELIABILITY, CONVERGENT AND DISCRIMINANT VALIDITY

Bagozzi and Heatherton (1994) note that it is not uncommon to have unsatisfactory fit when measurement models have more than four or five items per factor and sample sizes are large. In these cases, poor fit may relate to the high levels of random error found in typical items and the many parameters that must be estimated. Considering the complexity of the measurement models (i.e. five factors consisting of 20 items for both knowledge management orientation and innovative orientation), and the sample size (213 cases in total), the model fit indices for both knowledge management orientation and innovative orientation are acceptable. Additionally, compared with those of market orientation and learning orientation, which are both well established scales, the model fit indices of knowledge management orientation construct and the innovative orientation construct are both well received in this research (see Table 6.21). All the four measurement models (knowledge management orientation, innovative orientation, market orientation and learning orientation) demonstrate strong convergent validity, as entailed previously.

Table 6.21. A Summary Of First-Order Confirmatory Factor Analysis

		KMO	INNOVOR	MARKOR	LEARNOR	PERFORM
Source		New scale	New scale	Kohli et al 1993	Sinkula et al 1997	New scale
Factors		K-culture K-sharing K-memory K-system K-benchmarking	Behaviour Product Process Market Strategic	Intelligence generation, intelligence dissemination, responsiveness	Commitment to learning; shared vision; open mindedness	Return on capital employed; earnings per share
CFA model indices	χ^2	341.100	252.453	411.883	99.637	
	χ^2 /df	2.132	1.578	2.466	2.430	
	Df	160	160	167	41	
	GFI	.866	.897	.829	.923	
	RMSEA	.073	.052	.083	.082	
	PCLOSE	.000	.372	.000	.006	
	PGFI	.660	.683	.659	.574	
	NFI	.857	.874	.780	.925	
	CFI	.918	.949	.855	.954	
	RMR	.167	.108	.166	.093	
	AGFI	.824	.864	.785	.876	
	NCP	181.100	92.453	244.883	58.637	
Reliability	Alpha	.9104	.9091	.9152	.9000	.7980

Source: Survey data analysis

The Cronbach's reliability test shows that all the measurement constructs have high level of reliability: Alpha-values for knowledge management orientation, innovative orientation, learning orientation and market orientation are all above 0.9, while the alpha-value for performance is 0.798, very close to 0.8. Therefore, the reliability of all measurement constructs is established.

Discriminant validity of five constructs (i.e. knowledge management orientation, learning orientation, innovative orientation, market orientation and performance), consisting of 17 subcomponents in total, is assessed by examining the 95 % confidence intervals (i.e. plus or minus 1.96 standard errors) around all (17x16)/2=136 pairwise factor correlations to see whether they encompass 1.0 (Anderson, 1987; Fornell and Larcker, 1981). Table 6.22 shows that the factor correlations differ considerably in value. The lowest correlation coefficient is 0.193 between the market innovativeness factor and the performance factor. The highest correlation coefficient is 0.765 between the market dissemination factor and the responsiveness factor. None of the correlation coefficients at the 95% confident interval encompasses 1.0, indicating discriminant validity among the constructs.

Table 6.22. Correlation Matrix Of The Measurement Construct Components

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
MARKOR (IG)	1.000																
(1)	.																
MARKOR (ID)	.630	1.000															
(2)	.000	.															
MARKOR (RP)	.693	.765	1.000														
(3)	.000	.000	.														
LEARNOR (CM)	.421	.464	.530	1.000													
(4)	.000	.000	.000	.													
LEARNOR (SV)	.429	.570	.599	.620	1.000												
(5)	.000	.000	.000	.000	.												
LEARNOR (OP)	.457	.557	.607	.499	.600	1.000											
(6)	.000	.000	.000	.000	.000	.											
KMO (culture)	.580	.586	.653	.549	.630	.689	1.000										
(7)	.000	.000	.000	.000	.000	.000	.										
KMO (sharing)	.454	.493	.546	.534	.595	.505	.634	1.000									
(8)	.000	.000	.000	.000	.000	.000	.000	.									
KMO (system)	.431	.453	.435	.487	.419	.312	.452	.448	1.000								
(9)	.000	.000	.000	.000	.000	.000	.000	.000	.								
KMO (memory)	.385	.520	.540	.451	.553	.478	.518	.555	.625	1.000							
(10)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.							
KMO (benchmark)	.560	.604	.641	.566	.538	.566	.634	.589	.612	.519	1.000						
(11)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.						
INNOVOR (behaviour)	.432	.472	.563	.513	.601	.593	.711	.611	.402	.498	.541	1.000					
(12)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.					
INNOVOR (product)	.477	.471	.587	.370	.415	.458	.532	.361	.331	.382	.522	.474	1.000				
(13)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.				
INNOVOR (process)	.546	.520	.640	.521	.469	.494	.634	.515	.465	.410	.609	.633	.533	1.000			
(14)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.			
INNOVOR (market)	.308	.243	.380	.323	.221	.319	.396	.268	.320	.272	.406	.475	.655	.491	1.000		
(15)	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.		
INNOVOR (strategic)	.386	.462	.595	.402	.464	.500	.603	.437	.405	.482	.527	.616	.551	.492	.472	1.000	
(16)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	
PERFORM	.401	.377	.437	.312	.394	.334	.327	.318	.271	.294	.307	.229	.441	.290	.193	.303	1.000
(17)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.005	.000	.

Note: (1) The first line is Pearson correlation coefficient; (2) The second line is significant level at the 95% confidence level; (3) The sample size is 213 cases in total.

6.7 CONCLUSIONS

This chapter reported data analysis of the measurement models of knowledge management orientation, innovative orientation, learning orientation, market orientation and performance. Confirmatory factor analysis was used to generate the measurement models for knowledge management orientation and innovative orientation. After data pruning, each of the newly specified constructs results in a measurement model of 5 correlated component factors and one general factor. Strictly confirmatory factor analysis was used to report the measurement models of market orientation and learning orientation. Through confirmatory factor analysis, convergent validity of each of the measurement constructs is established. Cronbach's reliability test was used and the overall reliability for knowledge management orientation, market orientation, innovative orientation and learning orientation is 0.90 or above. The performance construct consists of two items and the alpha value is 0.798. Therefore it is evidenced that all constructs are reliable. The discriminant validity of measurement models was analysed through Pearson correlation. At the 95% confidence level, the correlation coefficients between pairs of 17 factors in total (5 factors for knowledge management orientation, 5 factors for innovative orientation, 3 factors for market orientation, 3 factors for learning orientation, and 1 for performance) differ considerably. None of the correlation coefficient encompasses 1.0. Hence, the discriminant validity of measurement constructs is established. As previously discussed, reliability, convergent and discriminant validity of measurement models are imperative before analysing structural models. This chapter, by employing various statistical analyses, establishes effective measurement constructs, which will be incorporated into data analysis of the structural model in Chapter 7.

Chapter Seven

Data Analysis: The Structural Model

*****

7.1 INTRODUCTION

This chapter reports data analysis of the structural model and tests the research hypotheses that were proposed in Chapter 4. The structure of this chapter follows four steps:

Firstly, this chapter reports data analysis of the structural model incorporating 5 latent variables consisting of 18 observed variables. The five latent variables are knowledge management orientation (with 5 observed variables), innovative orientation (with 5 observed variables), learning orientation (with 3 observed variables), market orientation (with 3 observed variables), and organisational performance (with 2 variables). This gives an overall picture of the structural model.

Secondly, the full structural model is cascaded down into several sub-models (or individual path analyses), emphasising different paths of the impact of knowledge management orientation on performance. Each path analysis incorporated both concerned latent variables and their observed variables. By doing this, the complex structural model can be simplified, with a view to achieve more accurate analysis of the structural model.

Finally, the structural model is revisited. At this stage, data analysis of the structural model only incorporates the five main factors (i.e. knowledge management orientation, innovative orientation, learning orientation, market orientation, and performance) as observed variables. By doing this, the limitation of small sample size in relation to the number of observed variables in the structural model can be optimised and it is more likely to reveal a more accurate picture of the full structural model.

7.2 THE STRUCTURAL MODEL: KMO AND PERFORMANCE

The relationships between knowledge management orientation, innovative orientation, market orientation, learning orientation and the impact on organisational performance were elaborated in Chapter 4 Research Models and Hypotheses Development, based on both theoretical and existing empirical research findings. A research model encompassing these factors was conceptualised, and hypotheses were formulated. This chapter empirically tests and reports the structural model. To be consistent with the measurement models, the Maximum Likelihood estimation method was used to run the structural model. A total of 213 cases were used in the analysis. Overidentified models were used for model identification.

The initial model fit indices without any modification are: Chi-square statistics=361.392, Chi-square/df=2.891, degree of freedom=125, GFI=0.842, RMSEA=0.094, PCLOSE=0.000, PGFI=0.616, NFI=0.858, CFI=0.901, RMR=0.079, AGFI=0.784, NCP=236.392 (see Figure 7.1 and Figure 7.2). Table 7.1 summarises the statistical significance of each regression. Regression weights and critical ratios (t-value) are shown in Table 7.2.

Table 7.1. A Summary Of Regression Coefficients

Statistically insignificant	Statistically significant
INNOVOR→LEARNOR	KMO→ INNOVOR
KMO→ MARKOR	KMO→ LEARNOR
INNOVOR→ MARKOR	MARKOR→ Performance
LEARNOR→ MARKOR	
INNOVOR→ Performance	
KMO→ Performance	
LEARNOR→ Performance	

Source: Survey data analysis

Table 7.2. The Structural Model: Regression Weights And Critical Ratios (t-value)

Statistical significance	Regression Path			Regression weight*	Estimate	S.E.	C.R.	P
Yes	Innovative_Orientation	←	KM_Orientation	0.907***	0.941	0.077	12.142	0.000
Yes	Learning_Orientation	←	KM_Orientation	1.105***	1.116	0.227	4.916	0.000
No	Learning_Orientation	←	Innovative_Orientation	-0.175	-0.170	0.203	-0.839	0.401
No	Market_Orientation	←	Learning_Orientation	0.216	0.168	0.258	0.650	0.516
No	Market_Orientation	←	KM_Orientation	0.444	0.349	0.364	0.959	0.338
No	Market_Orientation	←	Innovative_Orientation	0.223	0.168	0.153	1.101	0.271
Yes	Performance	←	Market_Orientation	0.441***	0.583	0.256	2.280	0.023
No	Performance	←	Innovative_Orientation	0.253	0.253	0.363	0.698	0.485
No	Performance	←	KM_Orientation	-0.981	-1.017	0.931	-1.093	0.275
No	Performance	←	Learning_Orientation	0.875	0.899	0.662	1.357	0.175
Fixed	PERFO.01	←	Performance	0.763	1.000**			
Yes	PERFO.03	←	Performance	0.872***	1.198	0.158	7.561	0.000
Fixed	KMO.SUB1	←	KM_Orientation	0.843	1.000**			
Yes	KMO.SUB2	←	KM_Orientation	0.737***	0.931	0.075	12.460	0.000
Yes	KMO.SUB3	←	KM_Orientation	0.619***	0.889	0.090	9.832	0.000
Yes	KMO.SUB4	←	KM_Orientation	0.681***	0.826	0.074	11.146	0.000
Yes	KMO.SUB5	←	KM_Orientation	0.793***	0.892	0.064	13.883	0.000
Fixed	IN.SUB1	←	Innovative_Orientation	0.801	1.000**			
Yes	IN.SUB2	←	Innovative_Orientation	0.704***	0.864	0.080	10.813	0.000
Yes	IN.SUB3	←	Innovative_Orientation	0.777***	0.718	0.059	12.206	0.000
Yes	IN.SUB4	←	Innovative_Orientation	0.607***	0.678	0.075	9.064	0.000
Yes	IN.SUB5	←	Innovative_Orientation	0.736***	0.785	0.069	11.414	0.000
Fixed	MO.SUB1	←	Market_Orientation	0.754	1.000**			
Yes	MO.SUB2	←	Market_Orientation	0.826***	1.475	0.119	12.436	0.000
Yes	MO.SUB3	←	Market_Orientation	0.924***	1.300	0.094	13.871	0.000
Fixed	OL.SUB1	←	Learning_Orientation	0.723	1.000**			
Yes	OL.SUB2	←	Learning_Orientation	0.799***	1.093	0.099	11.093	0.000
Yes	OL.SUB3	←	Learning_Orientation	0.756***	0.863	0.082	10.513	0.000

Note: * This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is fixed at 1, for model identification purposes.
***Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96)

The above results demonstrate contradictory findings to theories presented in existing literature as discussed in Chapter 4. One of the reasons that may be causing this could be sample size. For a complex model like this, a sample size of 213 cases is marginal. Therefore, these findings may be the results of sampling error. The complex nature of the structural model also leads to the relatively lower model fit indices as reported above.

Sampling error is related to sample size. The larger the sample size, the lower the sampling error. Large samples tend to give means that are better estimates of population means. Therefore sample size is very important when trying to estimate population parameters from sample statistics. Each statistical test requires a sufficient sample size. A common formula used to determine sample size is $n = (\sigma Z / \varepsilon)^2$. N is the sample size needed for the desired level of precision and confidence; ε is the effect size; and Z is the confidence level. However, in structural equation modeling, the researcher often requires a much larger sample size to achieve the accuracy of estimates and to optimise representiveness, partly due to the program requirements and the multiple observed indicator variables used to define latent variables (i.e. degrees of freedom in a measurement model) (Schumacker and Lomax, 1996). The minimum satisfactory sample size when conducting structural equation models is 100 to 150 cases (Anderson & Gerbing, 1988). The greater the sample size, the better the model's accuracy. However, the number of variables also needs to be considered into determining sample size. Rules of thumb in statistics are 10 to 20 cases per variable. In practice, this varies in different research. Bentler and Chou (1987) suggest that a ratio as low as 5 cases per variable would be sufficient for normal and elliptical distributions when the latent variables have multiple indicators, and that a ratio of at least 10 cases per variable would be sufficient for other distributions.

In the structural model of this study, there are 18 observed variables (see Figure 7.1). Following the rule of thumb of 10 to 20 cases per variable, a total sample size of 180 to 360 is required to perform the structural analysis. Whereas the sample size of this study is 213, it is slightly marginal to run the structural model in this study. To improve the accuracy of research findings, further investigation was carried out, by cascading the structural model into several direct and indirect paths. By doing this, the structural model can be simplified, and the ratio between sample size and number of variables can be increased. Because the main task of Section 7.3-7.9 is the regression path of latent variables, the prime interest is the regression weight and its associated critical ratio (t-value).

7.3 PATH ANALYSIS: KMO-MARKOR-PERFORMANCE

Firstly, the relationship between knowledge management orientation, market orientation and performance is further examined. As shown in Figure 7.3a and 7.3b, the model fit indices are Chi-square=81.023, Chi-square/df=2.532, degree of freedom=32, GFI=0.933, RMSEA=0.085, PCLOSE=0.007, PGFI=0.543, NFI=0.933, CFI=0.958, RMR=0.056, AGFI=0.886, NCP=49.023. The figures demonstrate a relatively good fit of the model, although Chi-square statistics and the associated p-value suggest otherwise. It is well documented that chi-square statistics are very sensitive to sample size. For a sample size of 213, it is very likely that the Chi-square statistics are going to be large, which implies the sample data do not fit the hypothesised model well (Byrne, 1998, Maruyama, 1998, Schumacker and Lomax, 1996, Hoyle, 1995). Most of the other fit indices such as GFI, NFI, CFI, AGFI indicate the sample data fit the hypothesised model well.

Table 7.3 KMO-MARKOR-Performance: Regression Weight & Critical Ratios (t-value)

		Regression weight*	Estimate	S.E.	C.R.	P
Market_Orientation	← KM_Orientation	0.852**	0.722	0.071	10.151	0.000
Performance	← Market_Orientation	0.539**	0.719	0.249	2.891	0.004
Performance	← KM_Orientation	-0.005	-0.005	0.203	-0.027	0.979

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

Table 7.3 summarises the regression weights and critical ratios (t-value) of each path. The results support the hypothesis that knowledge management orientation impacts performance through market orientation. The standardised regression coefficient of KMO→MARKOR is 0.85, significant at $p<0.001$level ($t=10.151$). The standardised regression coefficient of MARKOR→ performance is 0.54 at the $p<0.004$ significant level ($t=2.891$). However, the direct link between knowledge management orientation and performance is statistically insignificant (p=0.979, t=-0.027). Therefore, the hypothesis that knowledge management orientation has direct impact on performance cannot be accepted. Whilst the hypothesis that market orientation mediates the impact of knowledge management orientation on organisational performance is statistically significant and thus accepted.

7.4 PATH ANALYSIS: KMO-LEARNOR-PERFORMANCE

This path analysis tests the relationship between knowledge management orientation, learning orientation and performance. The model fit indices are: Chi-square=106.459, Chi-square/df=3.327, degree of freedom=32, GFI=0.914, RMSEA=0.105, PCLOSE=0.000, PGFI=0.532, NFI=0.906, CFI=0.931, RMR=0.067, AGFI=0.852, NCP=74.459 (see Figure 7.4a and 7.4b). The fit indices such as GFI, NFI, CFI demonstrate a good fit of the model with the sample data. The regression weights (as summarised in Table 7.4) show that knowledge management orientation has a direct impact on learning orientation (regression coefficient=0.94, p<0.001, t=10.672). However, learning orientation does not have a direct impact on performance (regression coefficient=0.77, p=0.099, t=-1.651). This indicates that the hypothesis that learning orientation mediates the impact of knowledge management on performance cannot be accepted, and the hypothesis that learning orientation has a direct impact on performance is rejected. The regression coefficient also shows that knowledge management orientation does not have a direct impact on performance (p=0.542, t=-0.610). This also confirms the previous findings from the analysis of the KMO→ MARKOR→ Performance path that knowledge management orientation does not directly impact on performance (see Figure 7.3a and 7.3b).

Table 7.4 KMO-LEARNOR-Performance: Regression Weights & Critical Ratios (t-value)

		Regression weight*	Estimate	S.E.	C.R.	P
Learning_Orientation	←KM_Orientation	0.940**	1.000	0.094	10.672	0.000
Performance	←KM_Orientation	-0.275	-0.290	0.476	-0.610	0.542
Performance	←Learning_Orientation	0.772	0.765	0.463	1.651	0.099

Note:

* This column is the standardised output. All the remaining outputs are from unstandardised estimation.

** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

7.5 PATH ANALYSIS: KMO-LEARNOR-MARKOR-PERFORMANCE

This path diagram analyses the relationships between knowledge management orientation, learning orientation, market orientation and performance. The overall model fit indices are Chi-square=152.996, chi-square/df=2.508, degree of freedom=61. GFI=0.904, RMSEA=0.084, PCLOSE=0.001, PGFI=0.606, NFI=0.910, CFI=0.944, RMR=0.063, AGFI=0.857, NCP=91.996 (see Figure 7.5a and 7.5b). The model fit indices of GFI, NFI, CFI show that the model fits the sample data. Although the previous findings do not support the hypothesis that learning orientation does not have a direct impact on performance, and therefore does not mediate the relationship between knowledge management orientation and performance, the statistics of this path diagram indicate that learning orientation has an impact on performance via market orientation. Therefore, knowledge management orientation impacts on learning orientation (standardised regression coefficient=0.97, $p<0.001$, t=10.915). Learning orientation impacts on market orientation (regression coefficient=0.86, $p<0.001$, t=9.357). Market orientation impacts on performance (regression coefficient=0.47, $p<0.01$, t=2.794). Whereas knowledge management orientation does not impact on performance – the p-value for regression coefficient is 0.612 (t=0.507). Details of regression weight and critical ratios (t-value) are summarised in Table 7.5. The findings support the hypotheses that learning orientation has direct impact on market orientation, and market orientation mediates the impact of learning orientation on performance. In the meantime, the findings also confirm previous analysis results that knowledge management orientation does not directly impact on performance, as indicated in Table 7.3 and 7.4.

Table.7.5 KMO-LEARNOR-MARKOR-Performance: Regression Weights & Critical Ratios (t-value)

			Regression weight*	Estimate	S.E.	C.R.	P
Learning_Orientation	←	KM_Orientation	0.971**	0.992	0.091	10.915	0.000
Market_Orientation	←	Learning_Orientation	0.860**	0.679	0.073	9.357	0.000
Performance	←	KM_Orientation	0.081	0.088	0.173	0.507	0.612
Performance	←	Market_Orientation	0.468**	0.627	0.224	2.794	0.005

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

7.6 PATH ANALYSIS: KMO-INNOVOR-PERFORMANCE

This path analysis explains the relationship between knowledge management orientation, innovative orientation and performance. Figure 7.6a and 7.6b show details of the output. The model fit indices are Chi-square=212.346, Chi-square/df=4.164, degree of freedom=51, GFI=0.862, RMSEA=0.122, PCLOSE=0.000, PGFI=0.564, NFI=0.851, CFI=0.881, RMR=0.090, AGFI=0.789, NCP=161.346 (see Figure 7.6a and 7.6b). The model fit indices of GFI, NFI, and CFI show a reasonable fit of the model and the sample data. The regression weight of KM Orientation →Innovative Orientation is 0.901. This is statistically significant ($p<0.001$, $t=11.613$). Therefore this finding supports the hypothesis that knowledge management orientation has direct impact on innovative orientation. However, the regression of KM orientation→ performance is not significant, its regression weight is 0.280, $p=0.168$, and $t=1.107$ (see Table 7.6). This is consistent with previous findings that knowledge management orientation does not have direct impact on performance.

Table 7.6 KMO-INNOVOR-Performance: Regression Weights & Critical Ratios (t-value)

			Regression weight*	Estimate	S.E.	C.R.	P
Innovative_Orientation	←	KM_Orientation	0.901**	0.959	0.083	11.613	0.000
Performance	←	KM_Orientation	0.280	0.291	0.262	1.107	0.268
Performance	←	Innovative_Orientation	0.185	0.180	0.246	0.734	0.463

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. t is above 1.96).

The regression of innovative orientation →performance is not significant (regression weight is 0.185, p=0.463, t=0.734). Therefore, this path analysis shows that innovative orientation does not have direct impact on performance. This is to some extent contradictory to existing research as discussed in Chapter 4. From the conceptual viewpoint, innovative orientation measures an organisation's innovative capability and its propensity to innovate. The ultimate impact of innovate orientation on performance might be mediated by new product development. Based on this argument, we introduced the variable of new product development as a mediator of the relationship between innovative orientation and performance, which will be tested in the following section.

7.7 PATH ANALYSIS: KMO-INNOVOR-NPD-PERFORMANCE

To further understand the mediating effect of innovative orientation on KMO→ performance, this path analysis incorporates new product development as a mediating factor (see Figure 7.7a and 7.7b). The new product development factor is measured by "number of new product developed over the last five years". As indicated in Figure 7.7a and 7.7b, the model fit indices are Chi-square=269.607, Chi-square/df=4.348, degree of freedom=62, GFI=0.831, RMSEA=0.126, PCLOSE=0.000, PGFI=0.566, NFI=0.832, CFI=0.864, RMR=0.097, AGFI=0.752, NCP=207.607.

Table 7.7. KMO-INNOVOR-NPD-Performance: Regression Weights & Critical Ratios (t-value)

			Regression weight*	Estimate	S.E.	C.R.	P
Innovative_Orientation	←	KM_Orientation	0.866**	0.894	0.084	10.607	0.000
NPD	←	Innovative_Orientation	0.701**	0.957	0.093	10.331	0.000
Performance	←	KM_Orientation	0.380	0.431	0.227	1.896	0.058
Performance	←	NPD	0.359**	0.289	0.085	3.418	0.001
Performance	←	Innovative_Orientation	-0.142	-0.156	0.246	-0.633	0.526

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

The model further reinforces the finding that knowledge management orientation has direct impact on innovative orientation (regression coefficient=0.866, p<0.001, t=10.607). Knowledge management orientation does not have a direct impact on performance (regression coefficient=0.380, p=0.058, t=1.896). Innovative orientation does not directly impact on performance (regression coefficient=-0.142, p=0.526, t=-0.633). Whereas innovative orientation directly impacts on new product development (regression coefficient=0.701, p<0.001, t=10.331). New product development directly impacts performance (regression coefficient=0.359, p=0.001, t=3.418). Details are reported in Table 7.7. Therefore, new product development mediates the impact of innovative orientation on performance. Furthermore, although knowledge management orientation does not impact on performance directly, it has strong indirect impact on innovative orientation, which through new product development impacts on performance outcome. From a purely statistical point of view, this model incorporating new product development as a mediator (shown in Figure 7.7a and 7.7b) is not a better fit than the KMO→INNOVOR→ Performance model (shown in Figure 7.6a and 7.6b). This is evidenced by the model fit indices as well as the changes of Chi-square statistics. GFI, CFI, NFI and other fit indices only changed marginally. However, the Chi-square statistics of the KMO→INNOVOR→ NPD→Performance increased 56.923 (from 212.346 to 269.289) for a gain of 10 degrees of freedom. This indicates that there is no significant improvement in introducing the NPD in the model. However, from the theoretical viewpoint, introducing new product development into the model enriches the understanding of the role of innovative orientation in performance outcomes. Therefore, this study retains the factor of new product development as a mediating factor, and adopts the KMO→INNOVOR→NPD→Performance model.

7.8 PATH ANALYSIS: KMO-INNOVOR-MARKOR-PERFORMANCE

This path analysis reveals the relationship between knowledge management orientation, innovative orientation, market orientation and performance. The model, without any modification, shows a relatively good fit with the sample data: Chi-square=289.414, chi-square/df=3.405, degree of freedom=85. GFI=0.851, RMSEA=0.107, PCLOSE=0.000, PGFI=0.603, NFI=0.858, CFI-0.894, RMR=0.84, AGFI=0.790, NCP=204.414 (see Figure 7.8a and 7.8b). The path analysis statistics show that knowledge management orientation directly impacts on innovative orientation (regression coefficient=0.937, p<0.001, t=11.972). Innovative orientation directly impacts on market orientation (regression coefficient=0.85, p<0.001, t=10.056). Market orientation directly impacts on performance (regression coefficient=0.487, p=0.008, t=2.661). However, innovative orientation does not directly impact on performance (regression coefficient=0.037, p=0.933, t=0.084). Knowledge management orientation does not directly impacts on performance (regression coefficient=0.014, p=0.969, t=0.039). Details are summarised in Table 7.8. These findings support the hypothesis that market orientation mediates the impact of innovative orientation on performance. However, the findings do not support the hypothesis that innovativeness orientation has a direct impact on performance.

Table 7.8 KMO-INNOVOR-MARKOR-Performance

			Regression weight*	Estimate	S.E.	C.R.	P
Innovative_Orientatior	←	KM_Orientation	0.937**	0.962	0.080	11.972	0.000
Market-Orientation	←	Innovative_Orientatior	0.850**	0.660	0.066	10.056	0.000
Performance	←	KM_Orientation	0.014	0.015	0.388	0.039	0.969
Performance	←	Innovative_Orientatior	0.037	0.038	0.453	0.084	0.933
Performance	←	Market_Orientation	0.487**	0.651	0.245	2.661	0.008

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

7.9 PATH ANALYSIS: KMO-INNOVOR-LEARNOR-MARKOR-PERFORMANCE

This section analyses the relationships between knowledge management orientation, innovative orientation, learning orientation, market orientation, and performance. The model fit indices are chi-square=398.611, chi-square/df=3.090, degree of freedom=129, GFI=0.825, RMSEA=0.099, PCLOSE=0.000, PGFI=0.623, NFI=0.844, CFI=0.888, RMR=0.084, AGFI=0.768, NCP=269.611 (see Figure 7.9a and 7.9b). The regression coefficients and their associated significance value show that knowledge management has direct impact on innovative orientation (regression coefficient=0.97, p<0.001, t=13.179). Innovative orientation has direct impact on learning orientation (regression coefficient=0.96, p<0.001, t=10.432). Learning orientation has direct impact on market orientation (regression coefficient=0.87, p<0.001, t=9.283). Market orientation has direct impact on performance (regression coefficient=0.45, p=0.007, t=2.695). However knowledge management orientation does not directly impact on performance (regression coefficient=-0.52, p=0.536, t=-0.619). Innovative orientation does not directly impact on performance (regression coefficient=0.61, p=0.496, t=0.680). Table 7.9 is the summary of regression weights and critical ratios (t-value). These statistics indicate that innovative orientation indirectly impact on performance when learning and market orientation occur.

Table. 7.9. KMO-INNOVOR-LEARNOR-MARKOR-Performance

			Regression weight*	Estimate	S.E.	C.R.	P
Innovative_Orientation	←	KM_Orientation	0.975**	0.997	0.076	13.179	0.000
Learning_Orientation	←	Innovative_Orientation	0.956**	0.910	0.087	10.432	0.000
Market_Orientation	←	Learning_Orientation	0.872**	0.697	0.075	9.283	0.000
Performance	←	Innovative_Orientation	0.607	0.616	0.906	0.680	0.496
Performance	←	KM_Orientation	-0.522	-0.542	0.876	-0.619	0.536
Performance	←	Market_Orientation	0.454**	0.605	0.224	2.695	0.007

Note:

* This column is the standardised output. All the remaining outputs are from unstandardised estimation.

** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

7.10 THE STRUCTURAL MODEL – A REVISIT

As discussed above, the statistics revealed from the above analysis of each individual path (from Section 7.3 to Section 7.9) contained some contradictory findings against the initial full structural model. This is mainly due to the complexity of the full structural model and the limitation of a marginal sample size. By cascading the full structural model into several sub-structural models (or path analysis) as presented above, the relationships between knowledge management orientation, innovative orientation, learning orientation, market orientation, new product development and performance can be better understood.

In order to allow a clearer underlying picture to emerge, this research revisited the original structural model by transforming the latent variables into observed ones, i.e. knowledge management orientation, learning orientation, innovative orientation, and market orientation are presented as four observed variables (see Figure 7.10a and 7.10b). Each of these observed variables is the mean of the measurement construct.

This is an allowable approach, given unidimensionality of each construct was established and verified in Chapter 6. However, it is worth noting that this approach may not be the best way, but serves to provide good indication of correct paths in the structural model.

As can be seen, the overall structural model demonstrates a very good fit with the sample data. Chi-square statistics=10.104, chi-square/df=1.443, degree of freedom=7, p=0.183, GFI=0.987, RMSEA=0.046, PCLOSE=0.482, PGFI=0.247, NFI=0.989, CFI=0.996, RMR=0.032, AGFI=0.947, NCP=3.104 (see Figure 7.10a and 7.10b). All the model fit indices meet the criteria in the strictest sense. The regression weights show that all the path coefficients are significant at $p<0.05$ significant level, except that the path coefficients of KMO→performance (p=0.887, t=-0.142); LEARNOR→performance (p=0.120, t=1.556); and INNOVOR→performance (p=0.322, t=-0.991) are statistically insignificant. A summary of regression weights and their associated significant levels are shown in Table 7.10.

Table 7.10. The Structural Model: Regression Weights & Critical Ratios (t-value)

			Standard regression weight *	Estimate	S.E.	C.R.	P
INNOVOR	←	KMO	0.720**	0.673	0.043	15.522	0.000
LEARNOR	←	INNOVOR	0.194**	0.237	0.077	3.068	0.002
LEARNOR	←	KMO	0.625**	0.708	0.071	9.907	0.000
MARKOR	←	INNOVOR	0.248**	0.280	0.073	3.825	0.000
MARKOR	←	KMO	0.380**	0.396	0.080	4.953	0.000
MARKOR	←	LEARNOR	0.229**	0.211	0.064	3.320	0.001
NPD	←	INNOVOR	0.678**	1.001	0.075	13.429	0.000
Performance	←	MARKOR	0.329**	0.343	0.112	3.069	0.002
Performance	←	KMO	-0.018	-0.019	0.135	-0.142	0.887
Performance	←	LEARNOR	0.169	0.163	0.104	1.556	0.120
Performance	←	INNOVOR	-0.118	-0.139	0.141	-0.991	0.322
Performance	←	NPD	0.319**	0.255	0.074	3.455	0.001
PERFO.01	←	Performance	0.804	1.000***			
PERFO.03	←	Performance	0.822**	1.072	0.131	8.208	0.000

Note:
* This column is the standardised output. All the remaining outputs are from unstandardised estimation.
** Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).
***The regression weight is fixed at 1.

The result of the above structural model is consistent with the outcomes of each path analysis. This indicates that the complex nature of the structural model and the sample size do restrict the findings of the structural relationships and affect the accuracy of outcomes. By examining path regressions of separated models, the structural relationships can be better revealed. Table 7.11 summarises the results of each path analysis and the full structural model, which were used to test research hypotheses.

Table 7.11. A Summary Of Research Hypotheses And Results

Research Hypotheses (The Structural Model)	Results
H 4.1: Market orientation has direct positive impact on organisational performance.	Accepted
H4.2: Learning orientation has direct positive impact on organisational performance.	Rejected
H4.3: Learning orientation has direct positive impact on market orientation.	Accepted
H4.4: Learning orientation impacts on performance, mediated by market orientation.	Accepted
H4.5: Organisational innovative orientation has direct positive impact on organisational performance.	Rejected
H4.6: Organisational innovative orientation has direct positive impact on learning orientation.	Accepted
H4.7: Organisational innovative orientation has direct positive impact on market orientation.	Accepted
H4.8: Market orientation mediates the impact of innovative orientation on organisational performance.	Accepted
H4.9: Learning orientation mediates the impact of innovative orientation on market orientation.	Accepted
H4.10: The impact of innovative orientation on organisational performance is mediated by a combination of market orientation and learning orientation.	Accepted
H4.11: Knowledge management orientation has direct positive impact on organisational performance.	Rejected
H4.12: Knowledge management orientation has direct positive impact on market orientation.	Accepted
H4.13: Knowledge management orientation has positive impact on organisational performance mediated by market orientation.	Accepted
H4.14: Knowledge management orientation has direct positive impact on learning orientation.	Accepted
H4.15: Knowledge management orientation has positive impact on organisational performance mediated by learning orientation.	Rejected
H4.16: Organisational learning orientation mediates the impact of knowledge management orientation on market orientation.	Accepted
H4.17: Knowledge management orientation has direct positive impact on innovative orientation.	Accepted
H4.18: Knowledge management orientation has positive impact on organisational performance mediated by innovative orientation.	Rejected

7.11 CONCLUSIONS

Data analysis of the structural model was reported in this chapter. It firstly incorporated 5 latent variables and all the 18 observed variables. However, the results presented some contradiction to existing research findings. Further analysis was performed by breaking down the structural model into seven sub-models in order to capture the relationships between variables in a more accurate manner. The seven sub-models reveal that knowledge management is positively related to market orientation, learning orientation and innovative orientation. However, knowledge management orientation does not impact on performance directly. Instead, the indirect impact of knowledge management orientation on performance occurs through a few paths. Firstly, knowledge management orientation indirectly impacts on performance when mediated by innovative orientation and new product development. Secondly, knowledge management orientation indirectly impacts on performance through market orientation. Learning orientation itself does not mediate the impact of knowledge management orientation on performance. It is through the linkage with market orientation that learning orientation mediates the impact of knowledge management orientation on performance. The direct impact on performance comes from two capabilities: the first one is market orientation. The other is new product development. Innovative orientation itself does not impact on performance directly, but only when new product developed. These relationships and their implications will be further discussed in Chapter 8. This chapter finally revisited the full structural model by aggregating all items of a construct into an observed variable as specified in Figure 7.10a and 7.10b. The findings were consistent with the results of the seven sub-models illustrated in Section 7.3 to 7.9.

Figure 7.1 The Structural Model (Standardised)

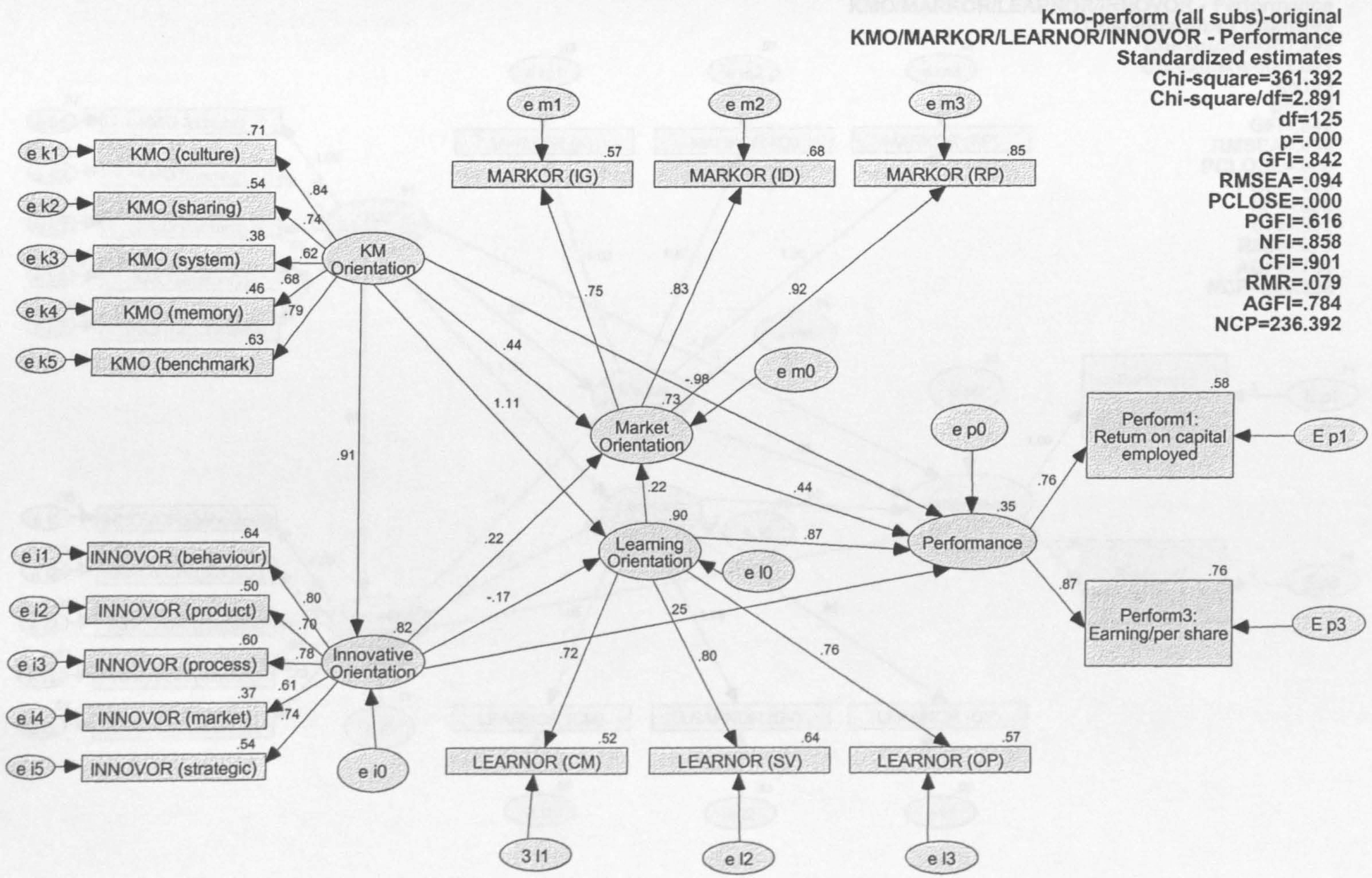


Figure 7.2. The Structure Model (Unstandardised)

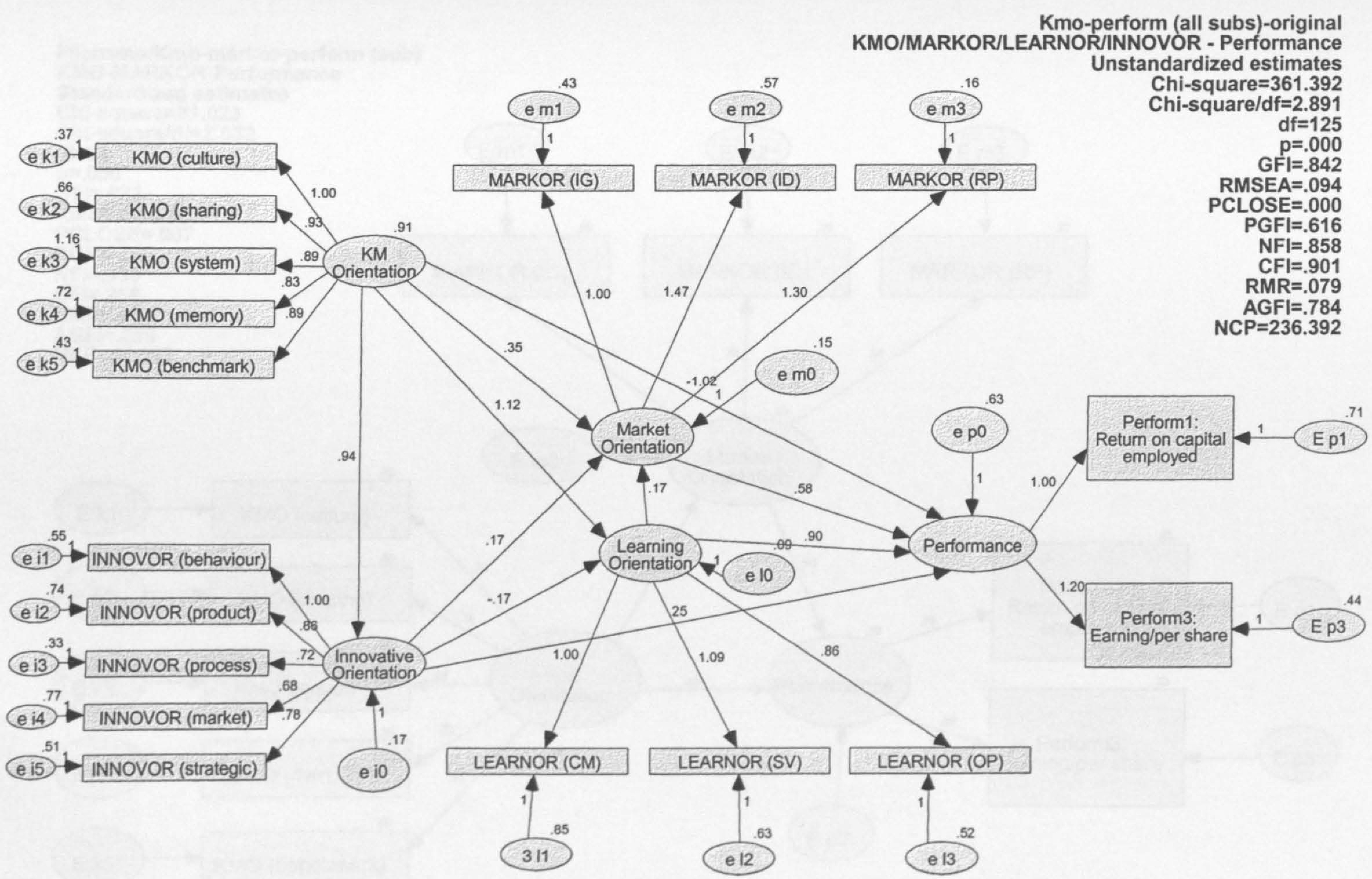


Figure 7.3a. KMO-MARKOR-Performance (Standardised)

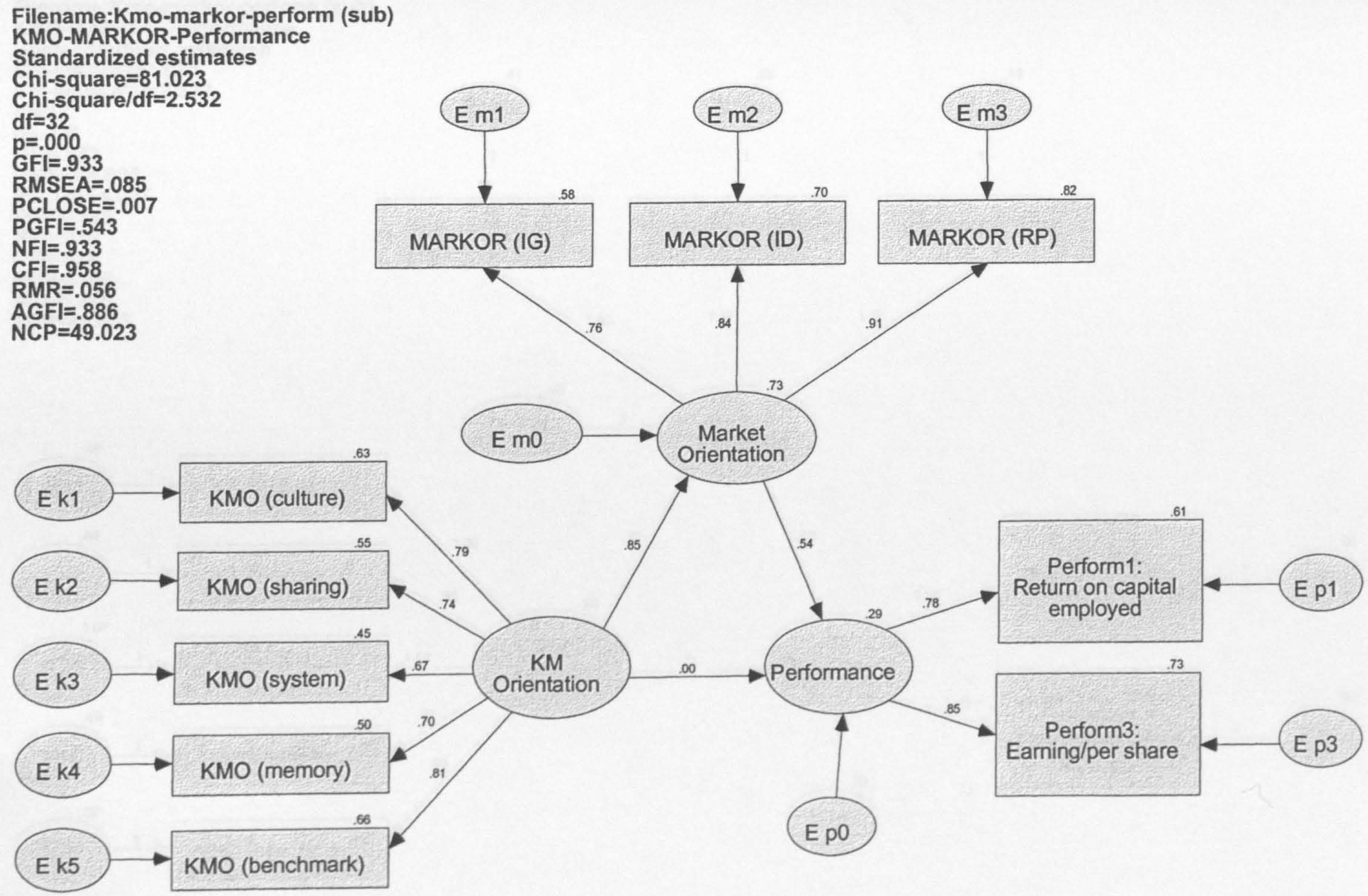


Figure 7.3b. KMO-MARKOR-Performance (Unstandardised)

Filename:Kmo-markor-perform (sub)
KMO-MARKOR-Performance
Unstandardized estimates
Chi-square=81.023
Chi-square/df=2.532
df=32
p=.000
GFI=.933
RMSEA=.085
PCLOSE=.007
PGFI=.543
NFI=.933
CFI=.958
RMR=.056
AGFI=.886
NCP=49.023

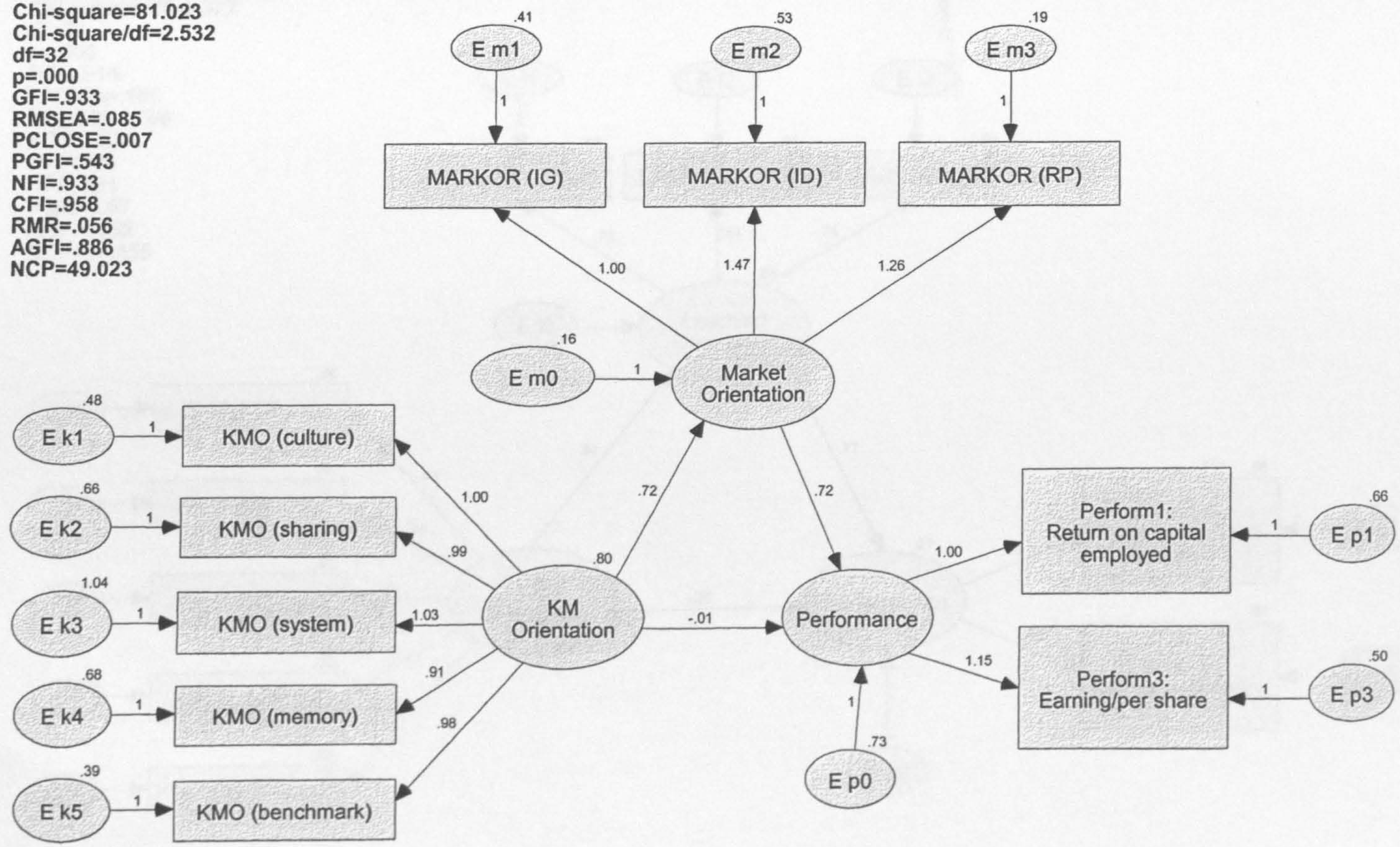


Figure 7.4a KMO-LEARNOR-Performance (Standardised)

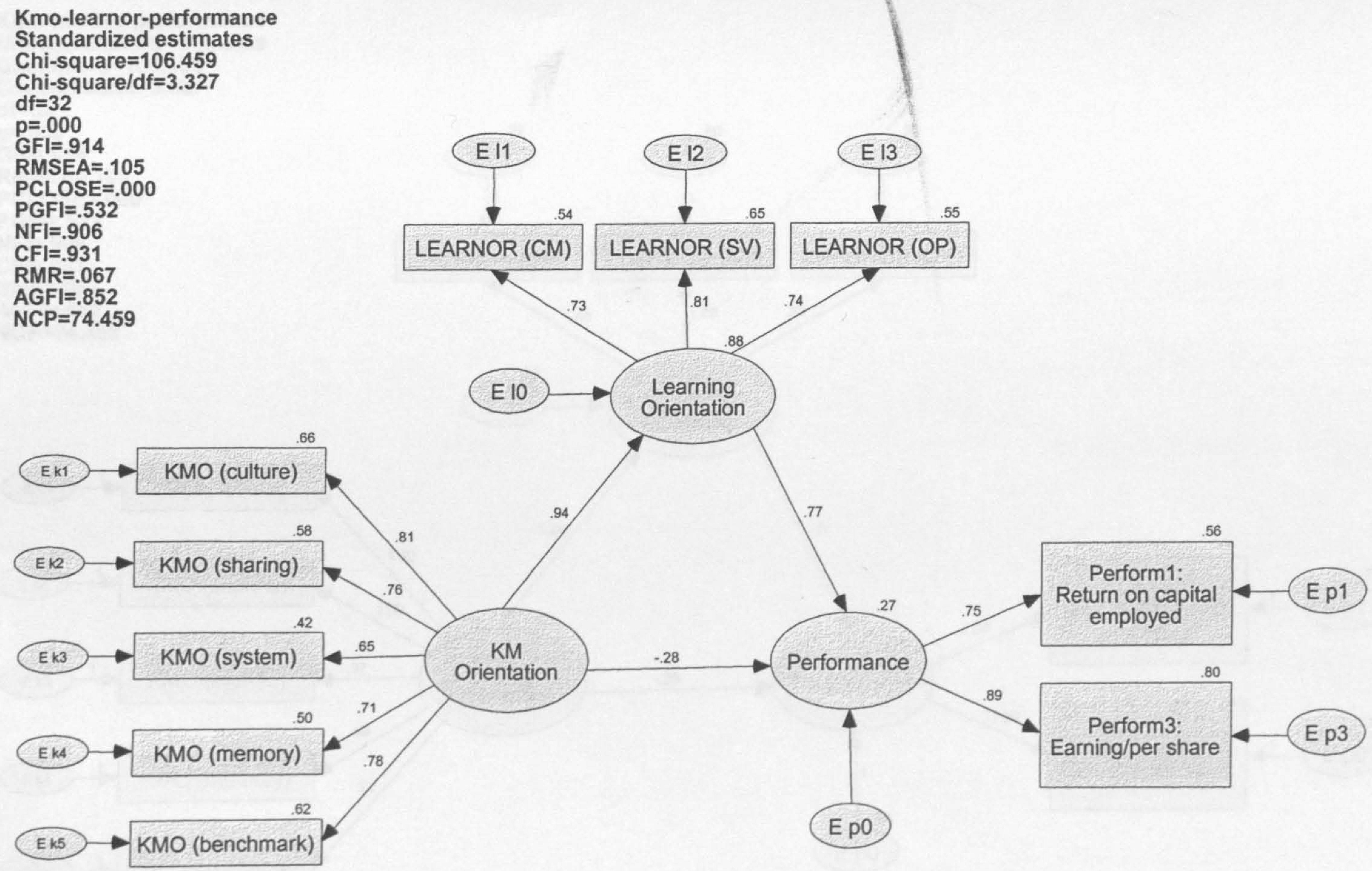


Figure 7.4b KMO-LEARNOR-Performance (Unstandardised)

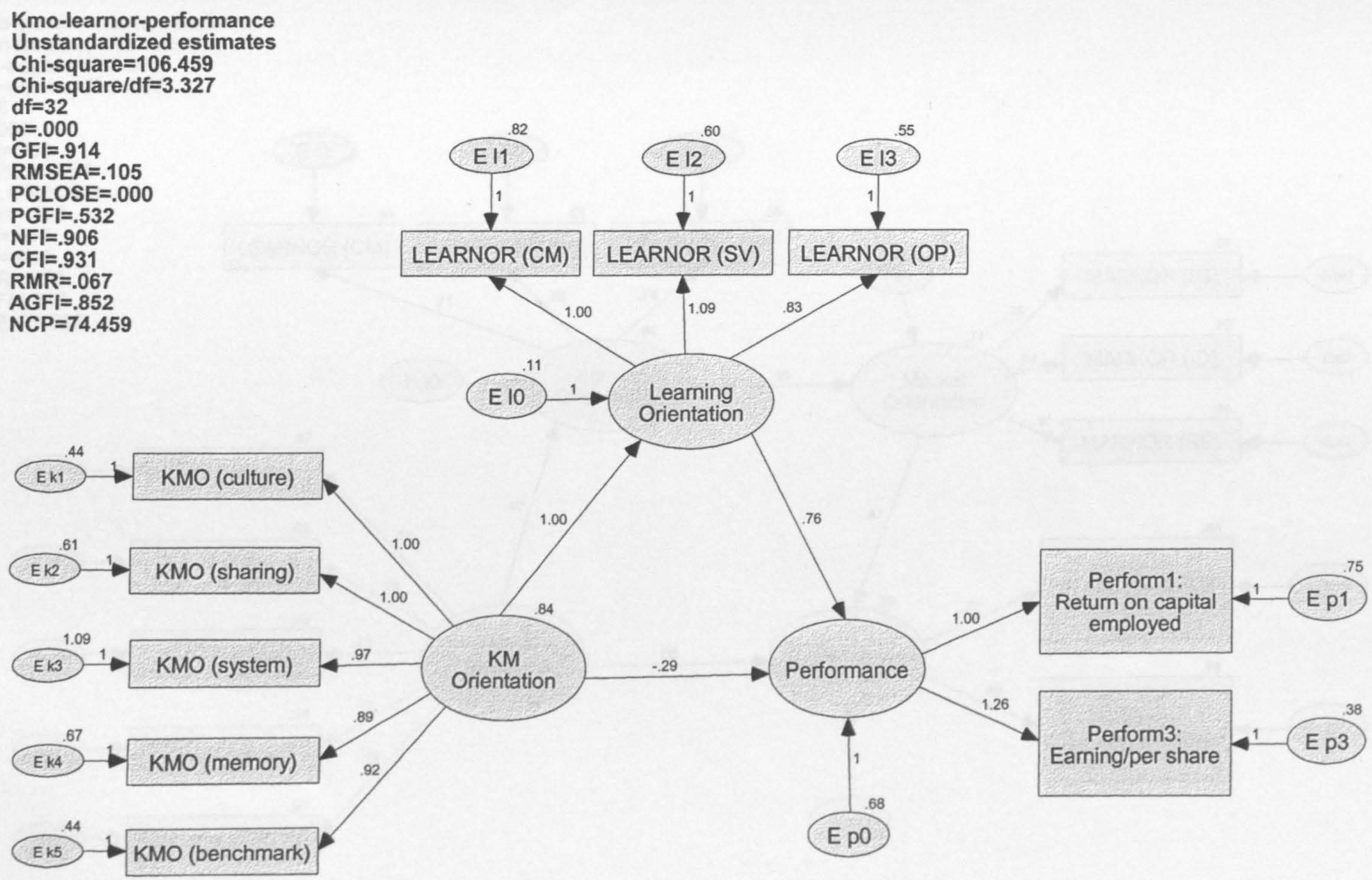


Figure 7.5a KMO-LEARNOR-MARKOR-Performance (Standardised)

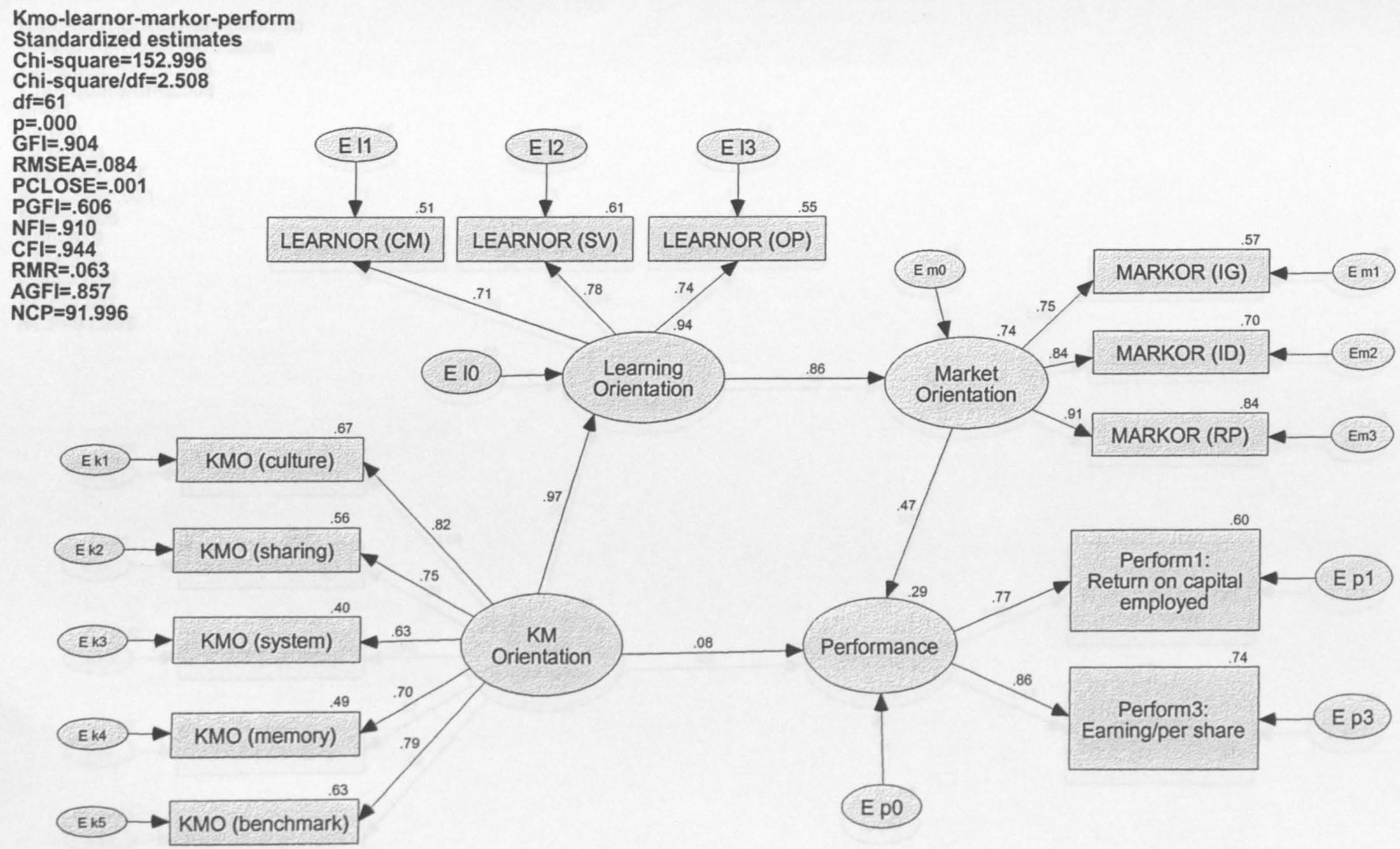


Figure 7.5b KMO-LEARNOR-MARKOR-Performance (Unstandardised)

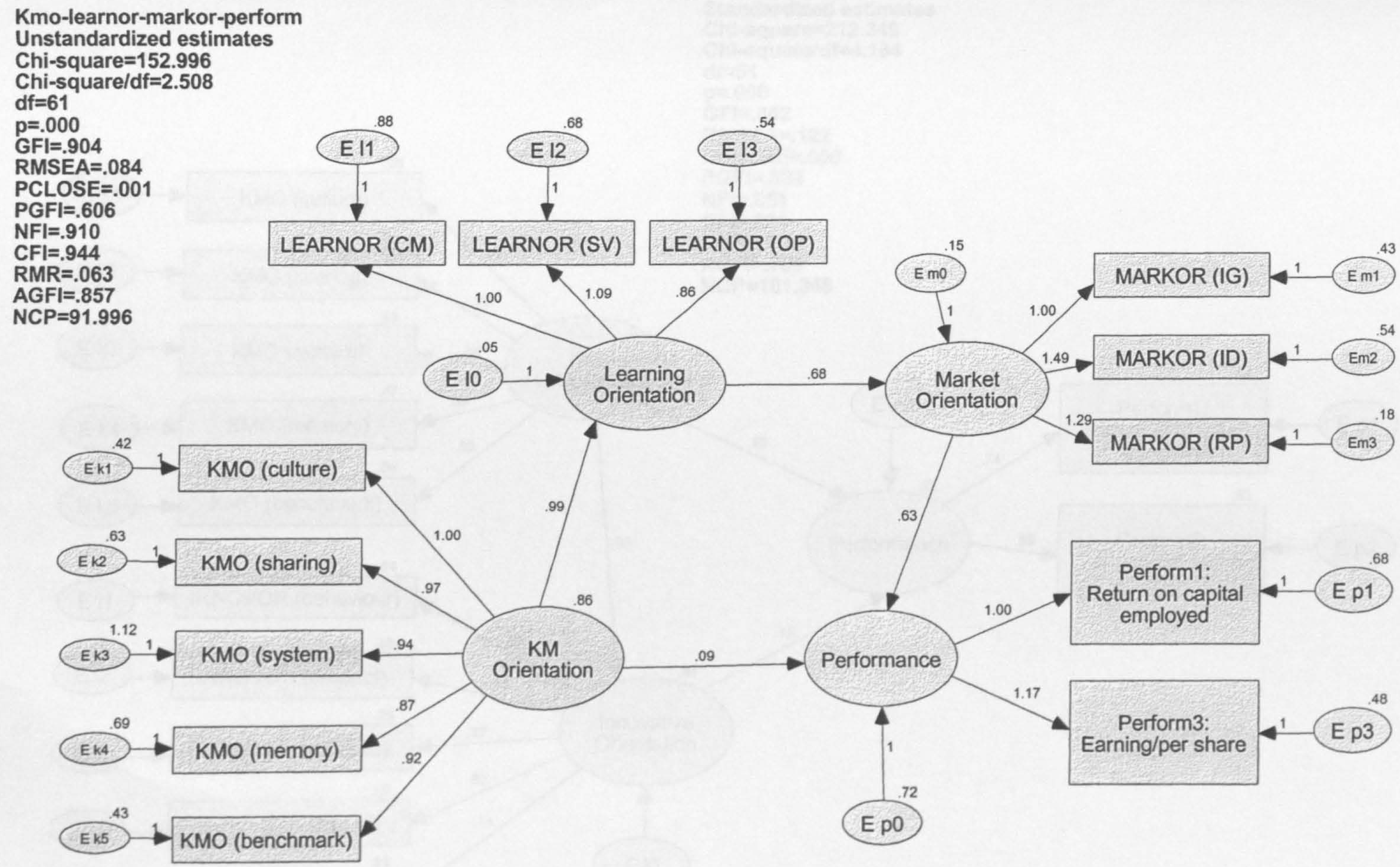


Figure 7.6a. KMO-INNOVOR-Performance (Standardised)

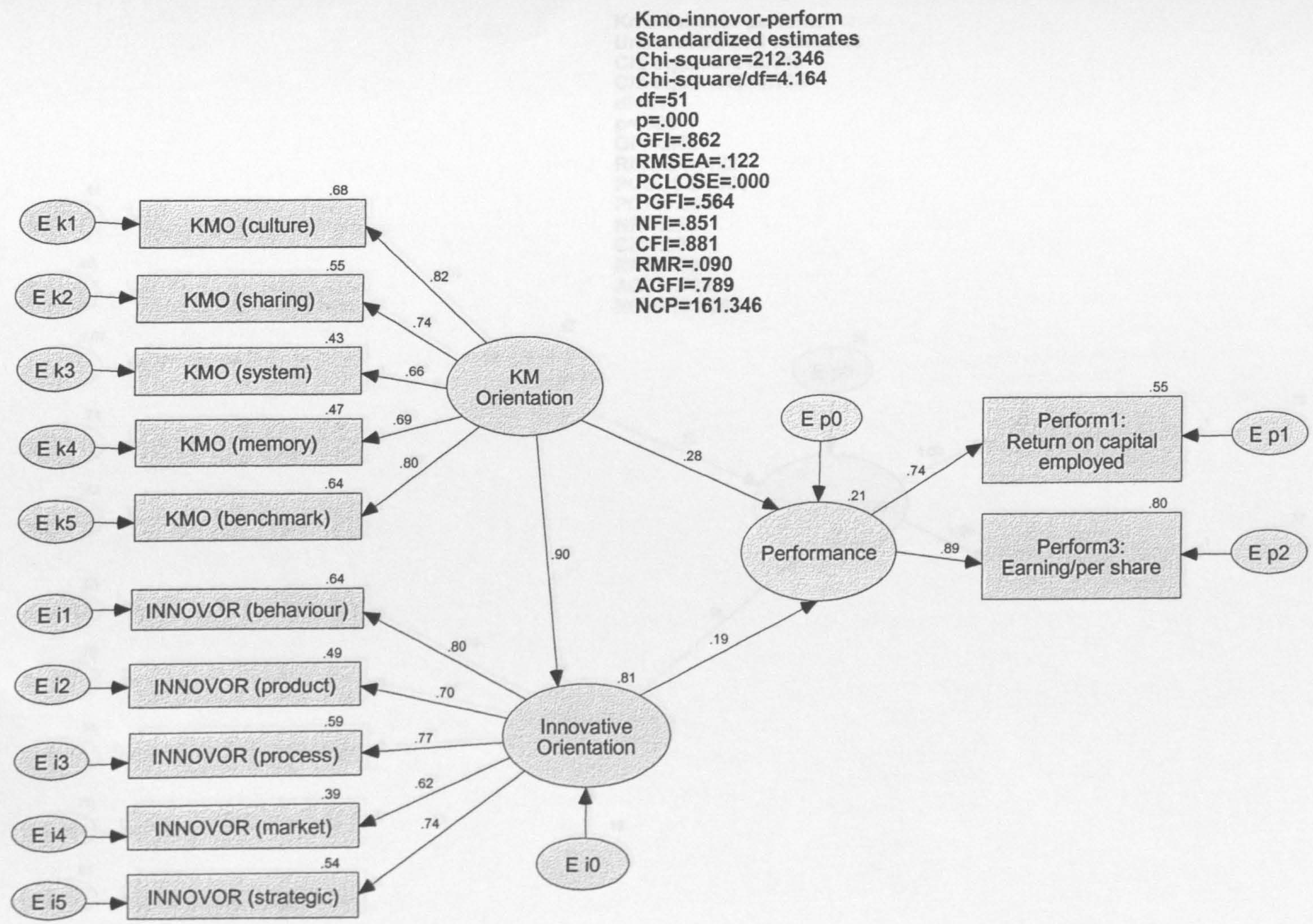


Figure 7.6b. KMO-INNOVOR-Performance (Unstandardised)

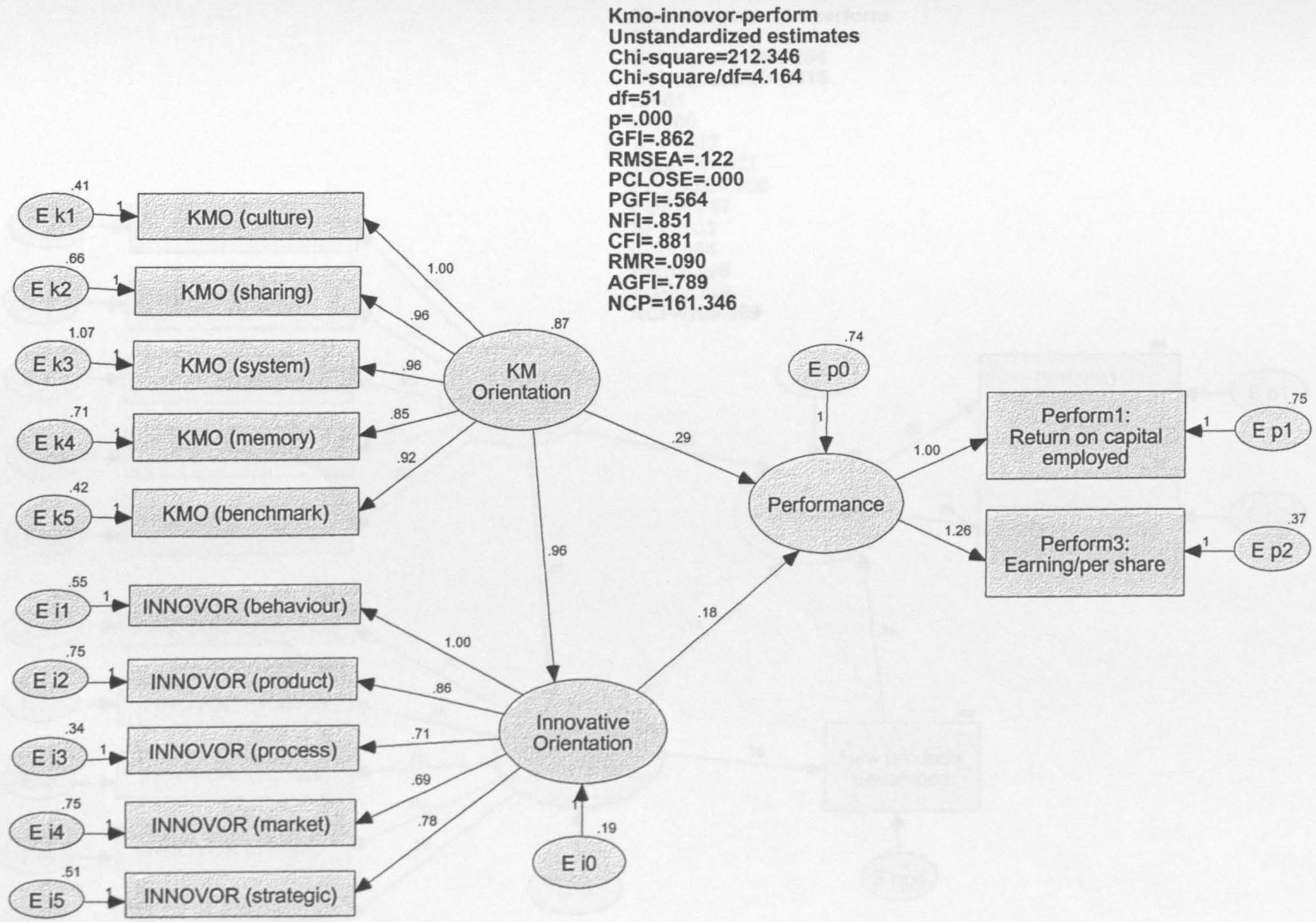


Figure 7.7a KMO-INNOVOR-NPD-Performance (Standardised)

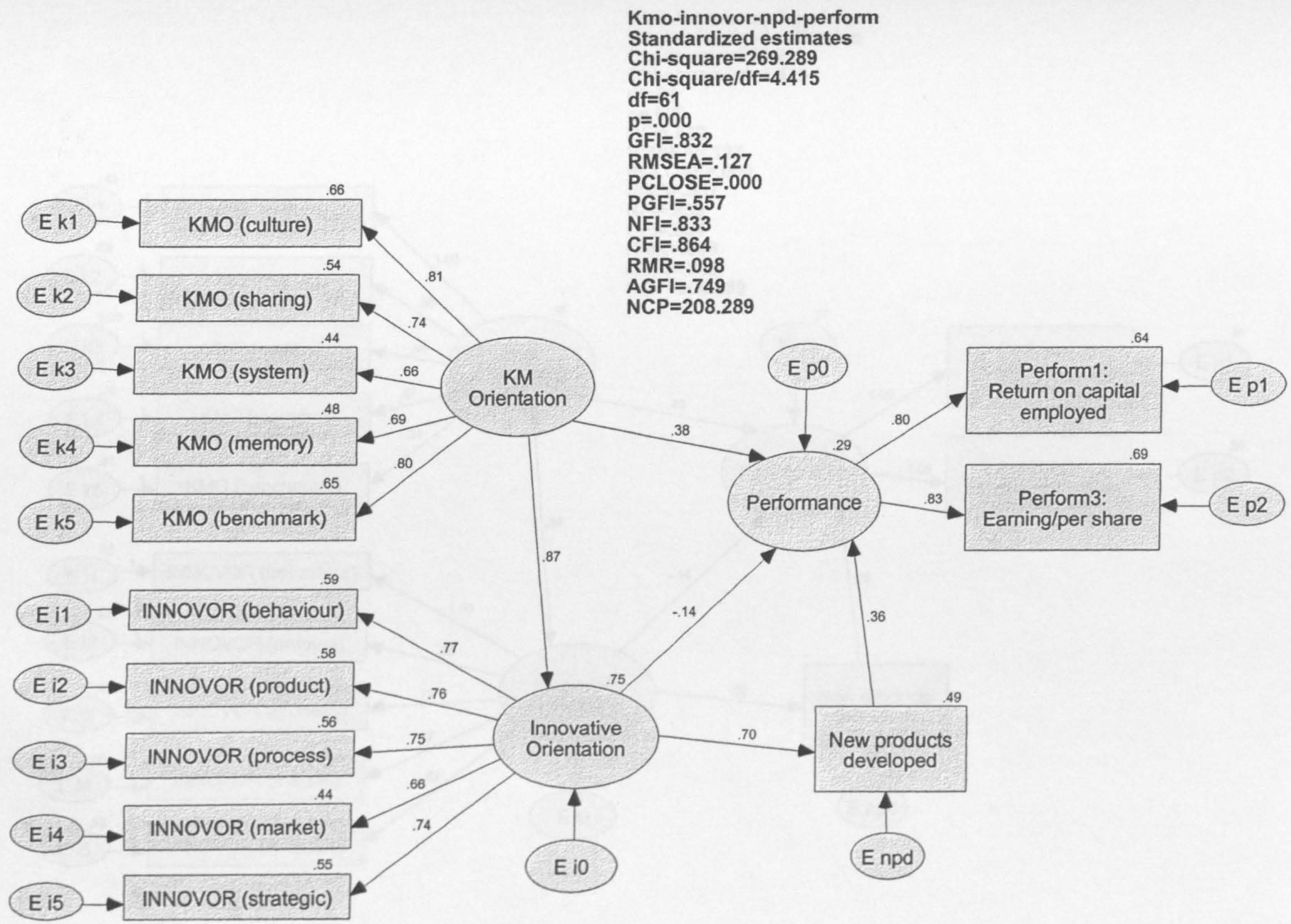


Figure 7.7b KMO-INNOVOR-NPD-Performance (Unstandardised)

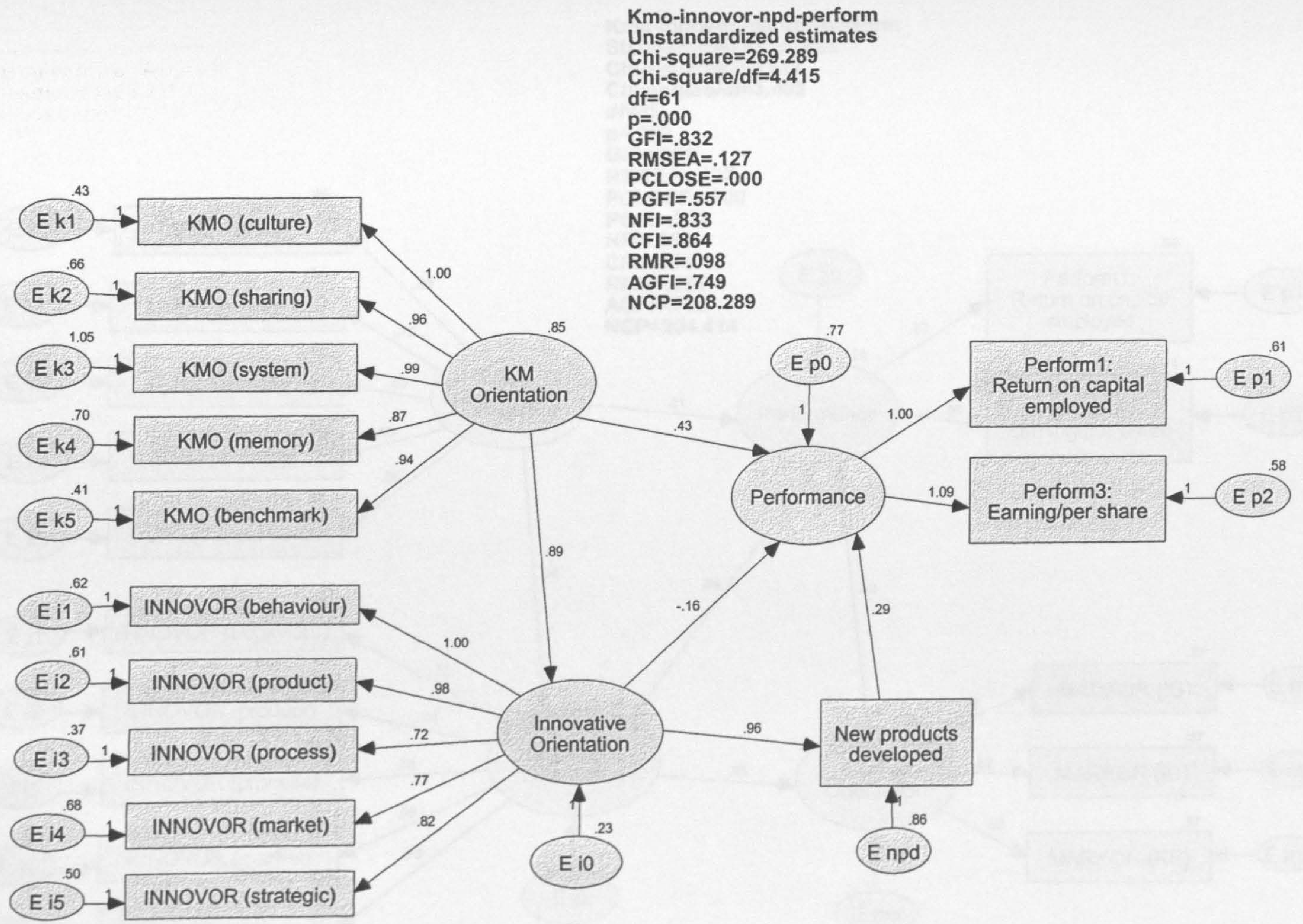


Figure 7.8a KMO-INNOVOR-MARKOR-Performance (Standardised)

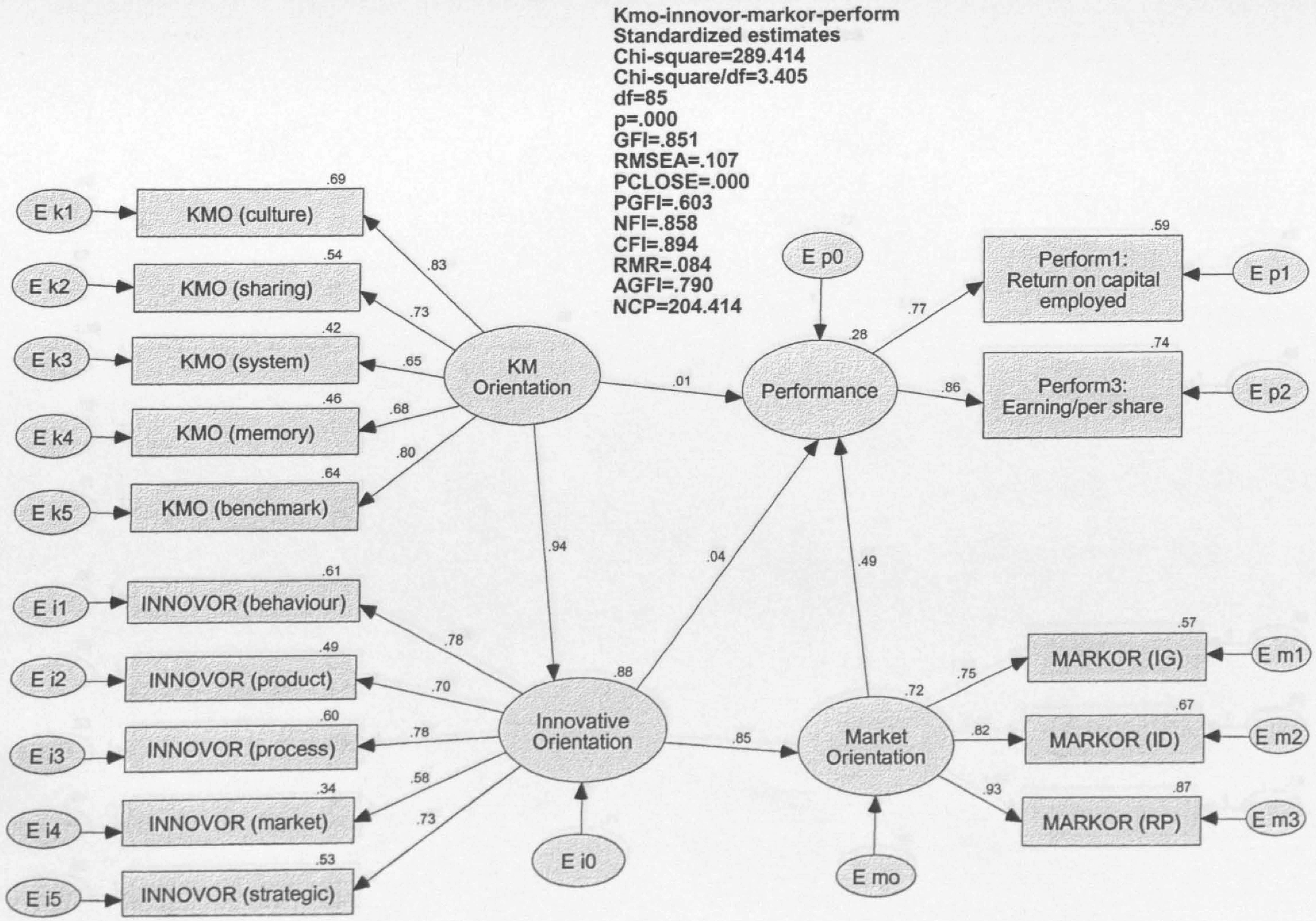


Figure 7.8b KMO-INNOVOR-MARKOR-Performance (Unstandardised)

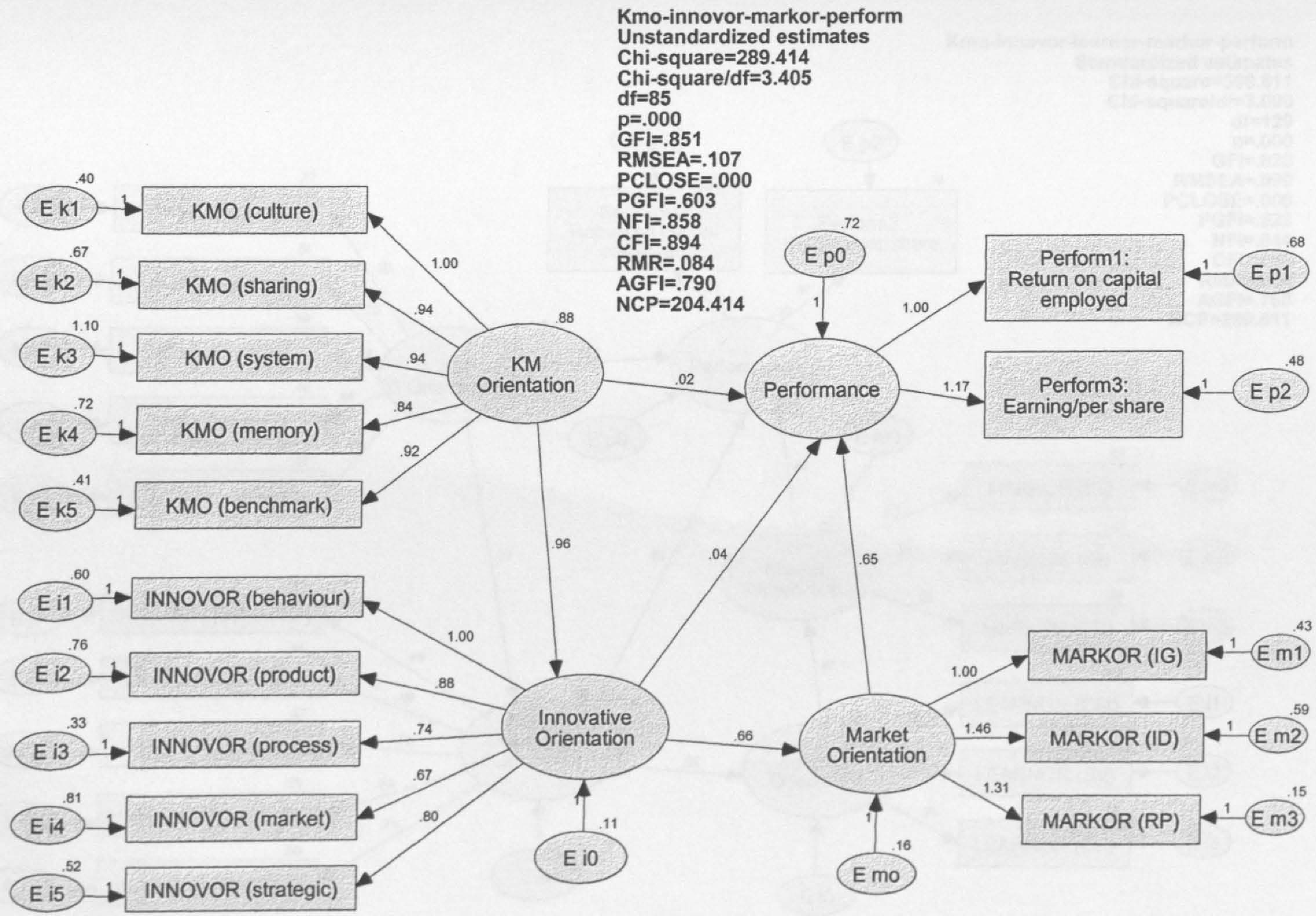


Figure 7.9a KMO-INNOVOR-LEARNOR-MARKOR-Performance (Standardised)

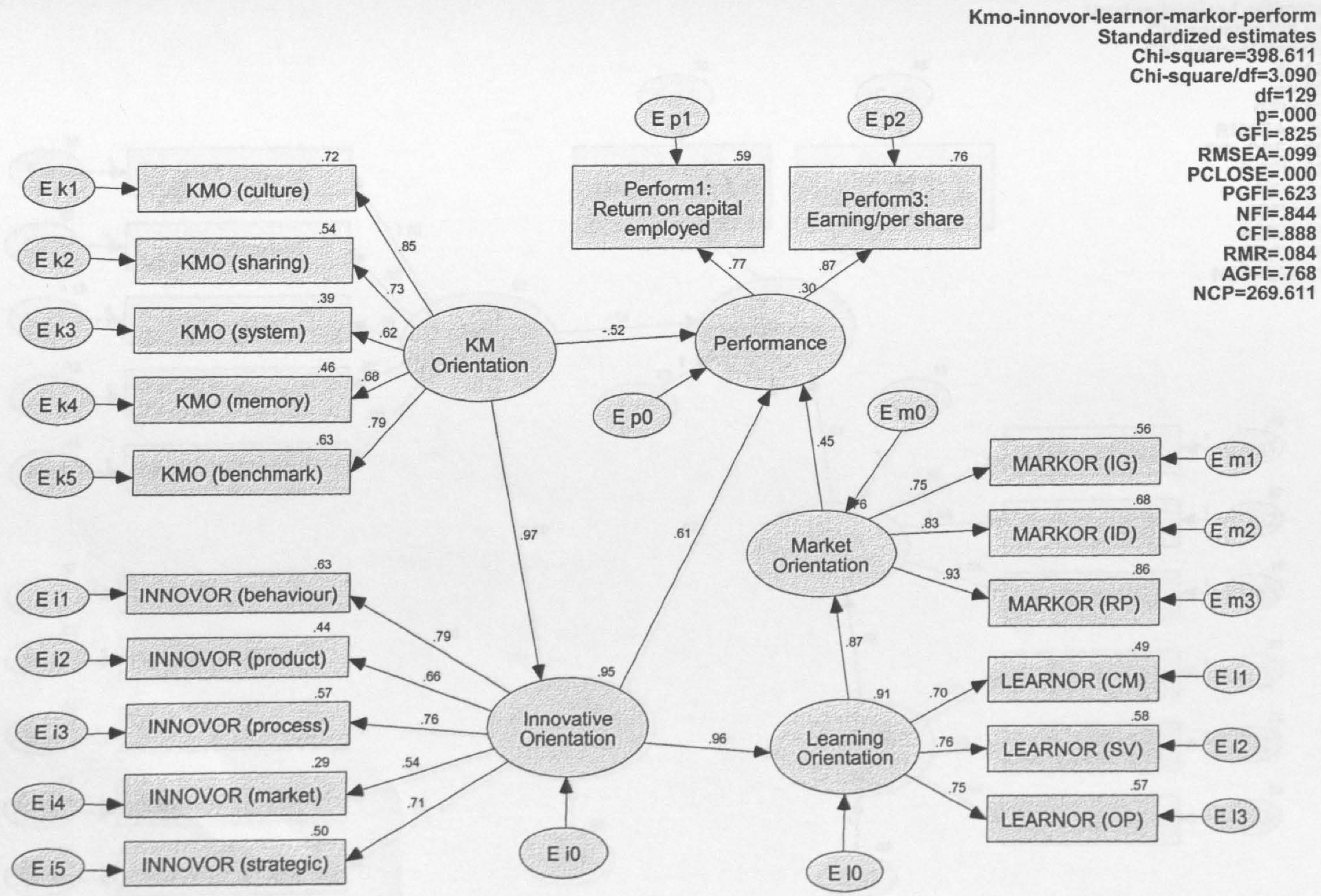
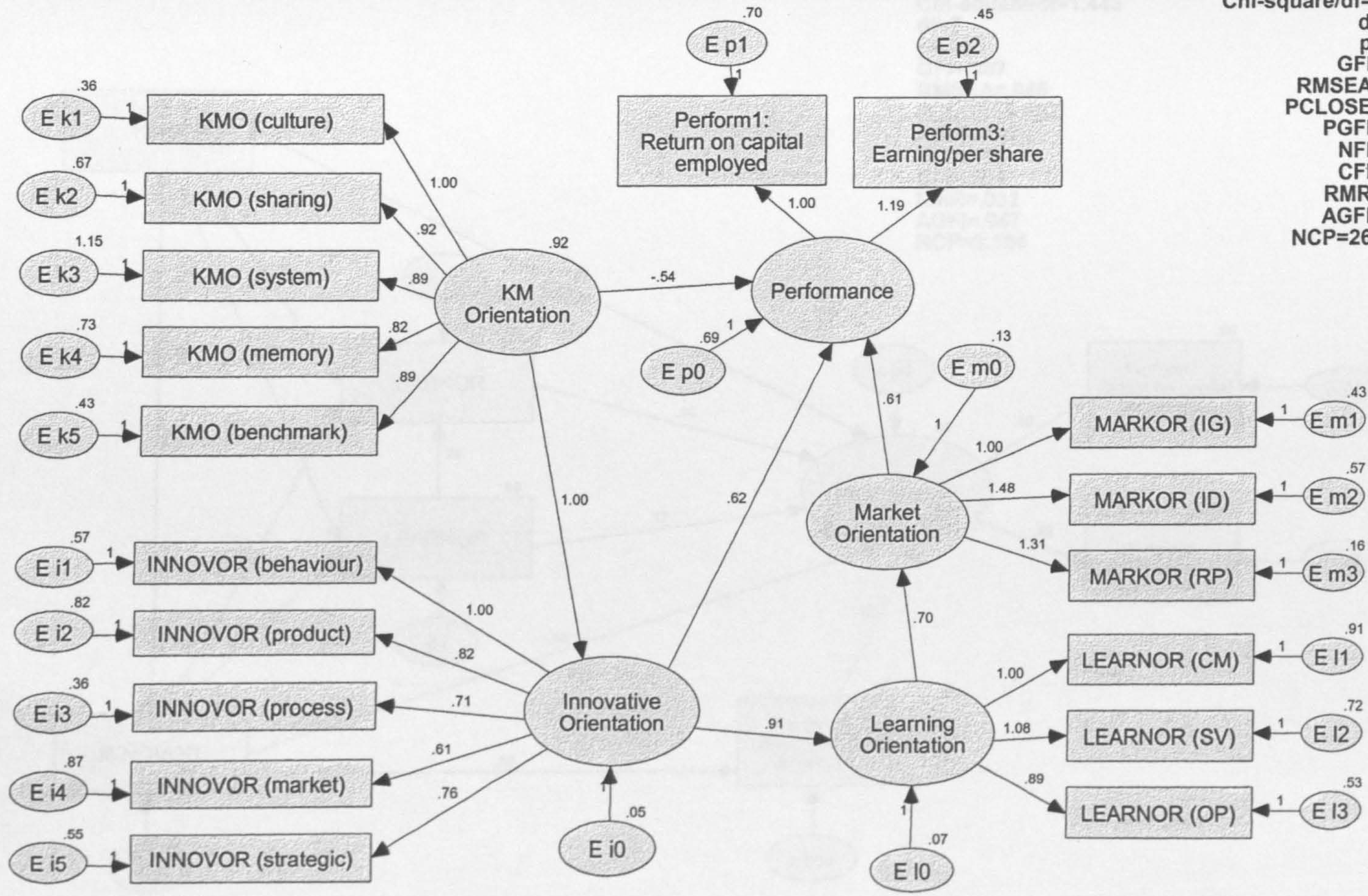


Figure 7.9b KMO-INNOVOR-LEARNOR-MARKOR-Performance (Unstandardised)



Kmo-innovor-learnor-markor-perform
Unstandardized estimates
Chi-square=398.611
Chi-square/df=3.090
df=129
p=.000
GFI=.825
RMSEA=.099
PCLOSE=.000
PGFI=.623
NFI=.844
CFI=.888
RMR=.084
AGFI=.768
NCP=269.611

Figure 7.10a The Structural Model: KMO-LEARNOR-MARKOR-INNOVOR-PERFORMANCE (Standardised)

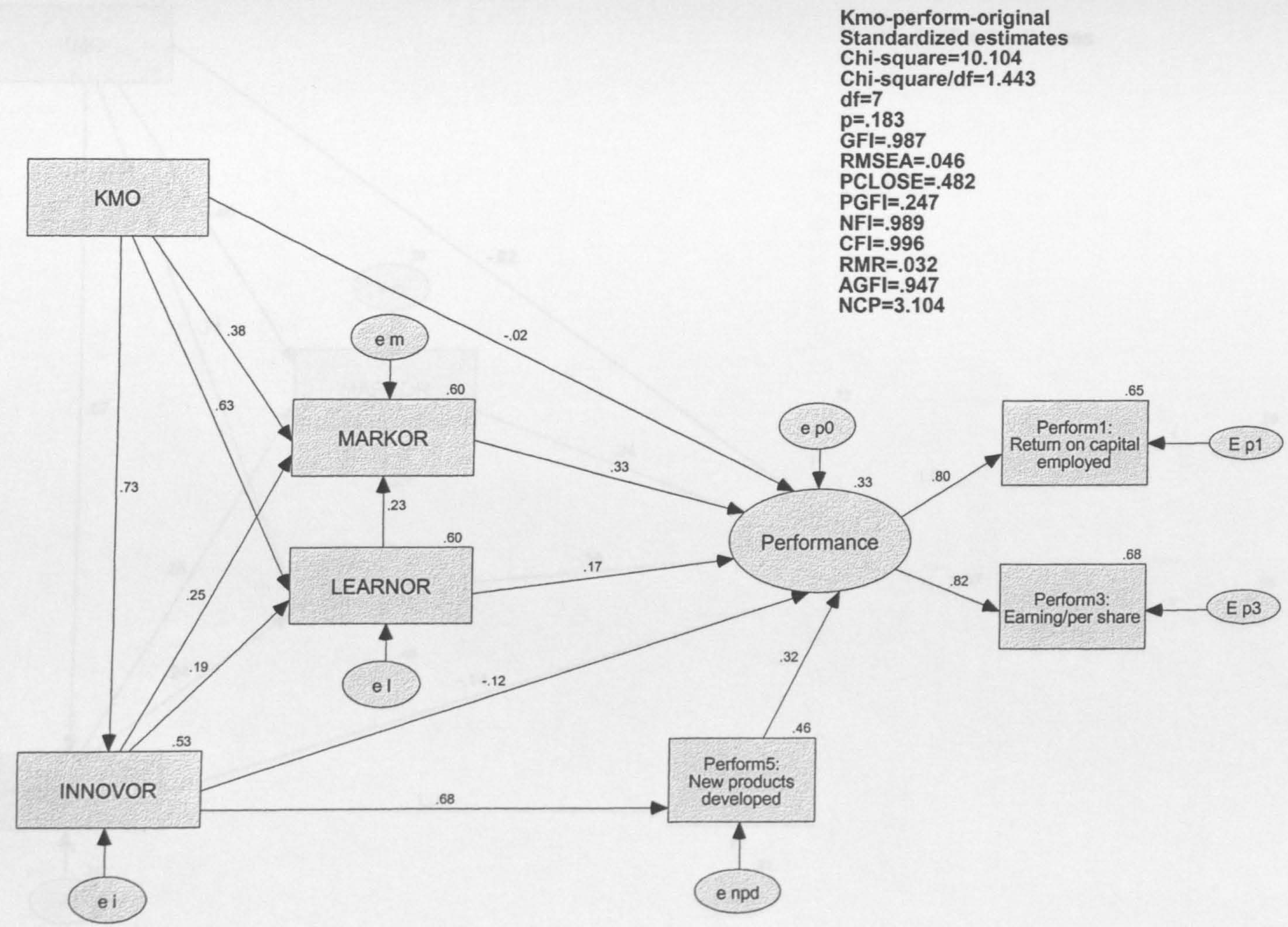
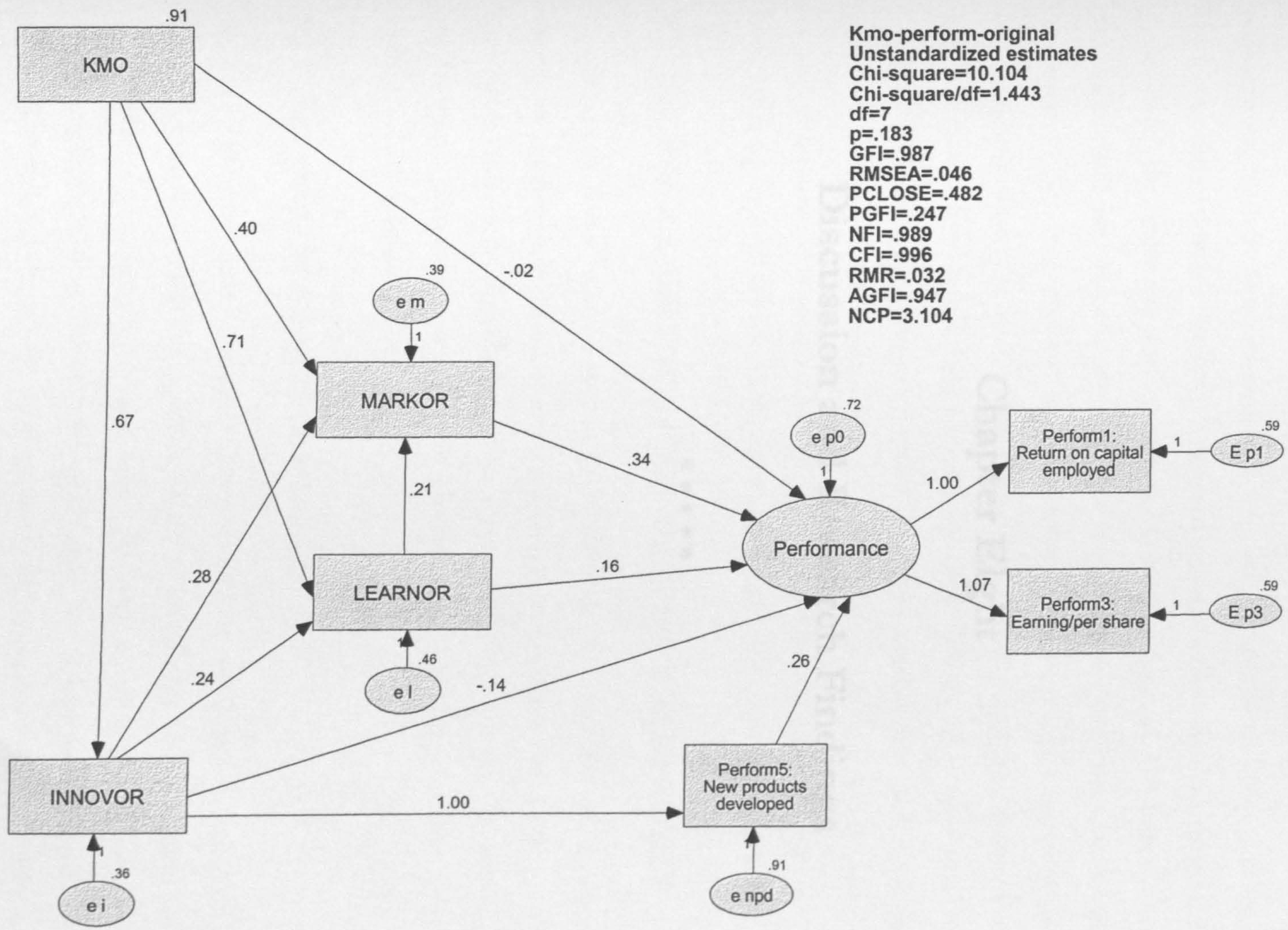


Figure 7.10b The Structural Model: KMO-LEARNOR-MARKOR-INNOVOR-PERFORMANCE (Unstandardised)



Chapter Eight

Discussion and Research Findings

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8.1 INTRODUCTION

Previous chapters studied the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance from both conceptual and empirical perspectives. Chapter 2 identified the factors that compose the knowledge management orientation construct. Chapter 3 reviewed the concepts and operationalisation of market orientation, learning orientation, and performance and identified the factors for organisational innovative orientation. Chapter 4 explored the relationships between all the concerned aspects of organisational capabilities. Chapter 6 empirically tested these measurement models and established the convergent and discriminant validity of these measurement constructs. Furthermore, Chapter 7 tested the causal relationships of these aspects as proposed in the structural model. Based on the previous analysis, this chapter reports on and elaborates the research findings. The discussions are grouped into two main categories: findings of the measurement models and findings of the structural model.

8.2 DISCUSSIONS AND FINDINGS OF THE MEASUREMENT MODELS

Confirmatory factor analysis was used to analyse the measurement models. The nature of confirmatory factor analysis requires that the observed measures and the underlying factors be specified a priori. Therefore, literature on the measurement models was systematically reviewed in Chapter 2 and 3. The following reports the findings of each measurement model.

8.2.1 Knowledge Management Orientation

At the theoretical level, Chapter 2 reviewed the concept of knowledge and knowledge management. The dynamic nature of knowledge and multidimensionality of knowledge management require that effective knowledge management is not simply managing information technology. People, technology and processes are three pillars of successful knowledge management programs, and must be taken into full consideration when measuring knowledge management performance. Consequently, five factors were identified as imperative aspects of knowledge management: the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking.

- The knowledge system is the tools and techniques that support knowledge management practices, and most importantly, how to utilise information technology to facilitate knowledge capturing, codification, categorisation, retrieval, as well as dialogues and communications between knowledge creators, possessors and users.

- Organisational memory refers to an organisation's capability of maintaining its knowledge gained from the past experience and retained in the form of prosthetic memory, personal memory, systems and procedures, structural memory, cultural memory, and external memory, etc. Additionally, the understanding of organisational memory is expanded to utilising stored knowledge to impact on present decisions, and refining and recreating the knowledge base when existing knowledge becomes obsolete.

- Knowledge sharing emphasises knowledge flow, instead of knowledge stock. Knowledge sharing may occur along the formal and informal structure of the organisation, as well as cross the organisational border and exchange with other organisations. Communities of practice are highly recommended as an effective mechanism of knowledge sharing. In many organisations, an imperative task is to encourage knowledge sharing by contributing to organisational memory and retrieving and utilising knowledge stored in the repository.

- A learning culture refers to the cultural characteristics that favour knowledge sharing and learning within an organisation. The identified characteristics are continuous learning, valid information, transparency, issue orientation, accountability and reward systems. A learning culture underpins the effective usage of knowledge systems, organisational memory and knowledge sharing. Therefore it is an important aspect of knowledge management orientation.

- Knowledge benchmarking refers to an organisation's capability of searching for industry best practices in managing knowledge, measuring its knowledge assets against other organisations in order to identify knowledge gaps, and improving its performance. Knowledge benchmarking maintains an external focus and keeps the organisation updated with advancements in the industry.

At the empirical level, confirmatory factor analysis of the knowledge management orientation construct (resulting in 20 items) supported that knowledge management orientation consists of the above five factors. As illustrated in Chapter 6, the second-order confirmatory analysis demonstrated that each of the five factors significantly loaded onto the general knowledge management orientation factor. The regression weight of KMO→K-culture was 0.81 (fixed). KMO→K-sharing was 0.75 (C.R.=8.292). KMO→K-system was 0.77 (C.R.=7.863). KMO→K-memory was 0.77 (C.R.=7.874). KMO→K-benchmarking was 0.90 (C.R.=6.502). The squared multiple correlations of these five factors were between 0.57 and 0.82 (see Table 6.3). Among the five factors, K-benchmarking had the highest regression weight and squared multiple correlations (which is 0.82), followed by K-culture with a squared multiple correlation of 0.65.

The first-order confirmatory factor analysis results indicated that each of the observed variables loaded significantly to its respective factors. The regression weights ranged from 0.46 to 0.90, all critical ratios (t-value) are significant at 95% confidence level (see Table 6.2). The overall first-order model fit indices (Chi-square statistics=341.100, Chi-square/degree of freedom=2.132, Degree of freedom=160, GFI=0.866, RMSEA=0.073, PCLOSE=0.000, PGFI=0.660, NFI=0.857, CFI=0.918, RMR=0.167, AGFI=0.824, NCP=181.100) showed that the hypothesised measurement model of knowledge management orientation cannot be rejected, taking into consideration of the complexity of the model and the sample size.

Reliability tests were performed. As listed in Table 6.4 and Table 6.5, the alpha value of each of five components was over 0.7, and the overall alpha value was 0.9274. The reliability of the knowledge management orientation was accepted.

8.2.2 Innovative Orientation

At the theoretical level, Chapter 3 reviewed and developed a conceptual framework for measuring organisational innovative orientation. Consequently innovative orientation is operationally defined as a set of capabilities of an organisation, which indicates a propensity to introduce new products to the market, or open up new markets, through combining their strategic innovative orientation with innovative behaviour and processes. The proposed components of this construct are stipulated as product innovativeness, market innovativeness, process innovativeness, behavioural innovativeness, and strategic innovation.

- Product innovativeness refers to the newness and novelty of new product developed, the useful nature of the new product developed from the customers' perspective, the speed of bringing new products into commercialisation, and the frequency of new product development.

- Market innovativeness refers to the innovation related to market research, advertising and promotion, and identification of new market opportunities and entry into new markets.

- Process innovativeness refers to introduction of new production methods, new management approaches, and new technologies that can be used to improve production and management processes.

- Behavioural innovativeness refers to behaviour that demonstrates innovative orientation, and reflects the "sustained behavioural change" of the organisation towards innovation. It can be demonstrated through individual innovativeness, team innovativeness and managerial innovativeness.

- Strategic innovation refers to fundamental reconceptualisation of what the business is all about that, in turn, leads to a dramatically different way of business operations in an existing business.

At the empirical level, confirmatory factor analysis of the innovative orientation construct (resulting in 20 items) proved that innovative orientation consists of the above five factors. As illustrated in Chapter 6, the second-order confirmatory factor analysis demonstrated that each of the five factors significantly loaded onto the general innovative orientation factor. The regression weight of INNOVOR→behavioural innovativeness was 0.77 (fixed). INNOVOR→product innovativeness was 0.82 (C.R.=7.083). INNOVOR→ process innovativeness was 0.84 (C.R.=6.761). INNOVOR→market innovativeness was 0.89 (C.R.=6.603). INNOVOR→ strategic innovation was 0.89 (C.R.=4.906). The squared multiple correlations of these five factors were between 0.59 and 0.80 (see Table 6.7). Among the five factors, market innovativeness and strategic innovation had the highest regression weights and squared multiple correlations (which is 0.80, and 0.79 respectively).

The first-order confirmatory factor analysis results indicated that each of the observed variables loaded significantly to its respective factors. The regression weights ranged from 0.42 to 0.91, all critical ratios (t-value) are significant at 95% confidence level (see Table 6.6). The overall first-order model fit indices (Chi-square statistics=252.453, Chi-square/degree of freedom=1.578, degree of freedom=160, GFI=0.897, RMSEA=0.052, PCLOSE=0.372, PGFI=0.683, NFI=0.874, CFI=0.949, RMR=0.108, AGFI=0.864, NCP=92.453) showed that the hypothesised measurement model of innovative orientation cannot be rejected, taking into consideration of the complexity of the model and the sample size.

Cronbach's coefficient alpha was calculated to test the internal consistency reliability. The alpha value of each of the five components shown in Table 6.8 were equal to or greater than 0.60. The overall alpha value of 20 items was 0.9091 (see Table 6.9). The reliability of the organisational innovativeness was accepted.

8.2.3 Market Orientation

Market orientation was adopted from Kohli and Jaworski (1990) and conceptualised as "the organisationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organisationwide responsiveness to it." The second-order confirmatory factor analysis showed that all three factors loaded well onto the general market orientation factor. The regression weight of the responsiveness factor had the strongest impact, with regression weight of 1.02 (C.R.=5.827) and squared multiple correlation of 1.04. Followed by the intelligence dissemination factor, regression weight being 0.92 (C.R.= 6.544), and squared multiple correlation being 0.84. The regression of the general market orientation factor to the intelligence generation factor is 0.85 (fixed), and the squared multiple correlation of intelligence generation is 0.72 (see Table 6.12).

The first-order confirmatory factor analysis results indicated that each of the observed variables loaded significantly to its respective factors. The regression weights ranged from 0.33 to 0.73, all critical ratios (t-value) were significant at 95% confidence level (see Table 6.11). The overall first-order model fit indices (Chi-square statistics=411.883, Chi-square/degree of freedom=2.466, degree of freedom=167, GFI=0.829, RMSEA=0.083, PCLOSE=0.000, PGFI=0.659, NFI=0.780, CFI=0.855, RMR=0.166, AGFI=0.785, NCP=244.883) showed that the hypothesised measurement model of market orientation cannot be rejected.

Cronbach's reliability test was performed for the overall construct as well as each of the three components. These were reported in the following Table 6.13 and Table 6.14. The alpha value for each subcomponent was above 0.7, while the overall construct reliability was 0.9152.

8.2.4 Learning Orientation

Learning orientation was adopted from Sinkula et al (1997). Its operational definition encompasses three factors: commitment to learning, shared vision and open-mindedness. The second-order confirmatory factor analysis showed that all three factors loaded well onto the general learning orientation factor. The regression weight of the shared vision factor had the strongest impact, with regression weight of 0.94 (C.R.=6.907) and squared multiple correlation of 0.88. Followed by the open-mindedness factor, regression weight being 0.85 (C.R.= 6.541), and squared multiple correlation being 0.72. The regression of the general learning orientation factor to the commitment to learning factor was 0.75 (fixed), and the squared multiple correlation of intelligence generation was 0.75 (see Table 6.17).

The first-order confirmatory factor analysis results indicated that each of the observed variables loaded significantly to its respective factors. The regression weights ranged from 0.43 to 0.89, all critical ratios (t-value) were significant at 95% confidence level (see Table 6.16). The overall first-order model fit indices (Chi-square statistics=99.637, Chi-square/degree of freedom=2.430, degree of freedom=41, GFI=0.923, RMSEA=0.082, PCLOSE=0.006, PGFI=0.574, NFI=0.925, CFI=0.954, RMR=0.093, AGFI=0.876, NCP=58.637) showed that the hypothesised measurement model of market orientation cannot be rejected.

Cronbach's reliability test showed that the overall organisational learning construct has an alpha value of 0.9000 (see Table 6.19). The alpha values for the three components were 0.8875 for the commitment to learning factor, 0.8696 for the shared vision factor, and 0.6244 for the open-mindedness factor (see Table 6.18).

8.3 DISCUSSIONS AND FINDINGS OF THE STRUCTURAL MODEL

Data analysis in Chapter 7 reported both direct and indirect links between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance. As indicated by the individual sub-models (illustrated in Section 7.3 to Section 7.9) and summarised in the revisited full structural model (see Table 7.10), neither knowledge management orientation, nor learning orientation nor innovative orientation had direct impact on performance. The direct impact on performance was made by market orientation (regression weight=0.329, C.R.=3.069), and new product development (regression weight=0.319, C.R.=3.455) (see Table 7.10 and Figure 7.10a and 7.10b). Knowledge management orientation, learning orientation and innovative orientation only had indirect impact on performance, respectively mediated by other factors.

8.3.1 KMO→MARKOR→Performance

Knowledge management orientation impacted on performance mediated by market orientation. This is evidenced in the data analysis of the structural model. As shown in Figure 7.10a and 7.10b, and Table 7.10, the path of KMO→performance was statistically not significant (regression weight=-0.018, C.R.=-0.142). While the regressions of KMO→MARKOR (regression weight=0.380, C.R.=4.953) and MARKOR→Performance (regression weight=0.329, C.R.=3.069) were both statistically significant. Referring to the path analysis of Section 7.3 (see Figure 7.3a, 7.3b, and Table 7.3), the KMO→ MARKOR→Performance demonstrated stronger mediating effect of MARKOR on the relationship of KMO and performance. It is apparent that the impact of KMO on performance was strongly mediated by MARKOR. The path of KMO→performance was not significant (regression weight=-0.005, C.R.=-0.027).

8.3.2 KMO→LEARNOR→MARKOR→Performance

Learning did not have direct impact on performance (regression weight=0.169, C.R.=1.556) (see Figure 7.10a, 7.10b and Table 7.10). Its impact on performance was mediated by market orientation. The path of LEARNOR→MARKOR was significant (regression weight=0.229, C.R.=3.320). A clearer picture was depicted in the KMO-LEARNOR-MARKOR-Performance path analysis in Section 7.5. As shown in Figure 7.5a, 7.5b and Table 7.5. KMO→LEARNOR was significant (regression weight=0.971, C.R.=10.915). LEARNOR→ MARKOR was significant (regression weight=0.860, C.R.=9.357). MARKOR → performance was also significant (regression weight=0.468, C.R.=2.794).

This reveals that an organisation's knowledge management capability does lead to higher level of organisational learning. However, for learning to impact on performance, a market focus has to be incorporated. This implies that an organisation's knowledge management orientation and learning orientation must be directed towards market orientation in order to positively impact on performance.

8.3.3 KMO→INNOVOR→NPD→Performance

KMO had direct impact on INNOVOR (regression weight=0.866, C.R.=10.607), (see Figure 7.7a, 7.7b and Table 7.7). Referring to the revisited full structure model (see Figure 7.10a, 7.10b and Table 7.10), similar results were evidenced. KMO→INNOVOR was significant (regression weight=0.720, C.R.=15.522).

However, innovative orientation did not have direct impact on performance. Its impact on performance was indirect, mediated by new product development. The structural model (see Figure 7.10a, 7.10b and Table 7.10) indicated that the direct path of INNOVOR → performance was not significant (regression weight = -0.118, C.R.=-0.991). However, the path of INNOVOR→NPD was significant (regression weight=0.678, C.R.=13.429), and NPD→performance was significant (regression weight=0.319, C.R.=3.455). This mediating effect was also evidenced in the individual path analysis of INNOVOR→NPD→performance (see Figure 7.7a, 7.7b and Table 7.7). The path of INNOVOR→performance was not significant (regression weight=-0.142, C.R.=-0.633). While the paths of INNOVOR→NPD, and NPD→Performance were both strong and significant (regression weight=0.701, C.R. =10.331 for INNOVOR→NPD; and regression weight=0.359, C. R.=3.418 for NPD→Performance). This indicated that knowledge management orientation itself did not directly impact on performance. However, knowledge management orientation did have strong positive impact on innovative orientation, but through new product development impacted on performance.

8.3.4 KMO→INNOVOR→MARKOR→Performance

Another indirect effect of innovative orientation on performance was mediated by market orientation. As illustrated in Figure 7.10a, 7.10b and Table 7.10, the regression weight of INNOVOR→MARKOR was 0.248 (C.R.=3.825), the regression weight of MARKOR→performance was 0.329 (C.R.=3.069). This mediating effect can also be seen from the individual path analysis of KMO → INNOVOR →MARKOR→performance (see Table 7.8a, 7.8b and Figure 7.8). INNOVOR→MARKOR was significant (regression weight=0.850, C.R.=10.056). MARKOR→performance was significant (regression weight= 0.487, C.R.=2.661).

While INNOVOR→performance was not significant (regression weight=0.037, C.R.=0.084). This means that an innovative organisation must be simultaneously market oriented in order to produce better performance.

This leads to another understanding of the relationship between knowledge management orientation and performance, one in which it is mediated by INNOVOR and MARKOR. As indicated in Figure 7.8a, 7.8b, and Table 7.8, the path of KMO→INNOVOR→MARKOR→Performance was statistically significant, with a total indirect effect of 0.937 x 0.850 x 0.487. This significance of the path was also supported in the revisited full structural model (see Figure 7.10a, 7.10b, and Table 7.10), which demonstrated an indirect effect of knowledge management orientation on performance at 0.720 x 0.248 x 0.329.

8.3.5 KMO→INNOVOR→LEARNOR→MARKOR→Performance

Referring to Figure 7.9a, 7.9b, and Table 7.9, it can be found that KMO→ INNOVOR→ LEARNOR→MARKOR→Performance develops another understanding of how knowledge management leads to better performance. The total indirect effect of this path was 0.975 x 0.956 x 0.872 x 0.454. This indicates a strong indirect effect from knowledge management to performance, mediated by a synergy of organisational learning and market orientation. From the revisited full structural model (see Figure 7.10a, 7.10b, and Table 7.10), this indirect effect is 0.720 x 0.194 x 0.229 x 0.329. All the regressions reported above were significant at 95% confidence level. Details of critical ratios (t-value) are reported in Table 7.9 and Table 7.10.

8.3.6 Summary of Direct and Indirect Effects and Implications

Although it did not have direct impact on performance, knowledge management orientation had strong positive direct impact on market orientation, learning orientation and innovative orientation. As can be seen from the structural model (see Table 7.10 and Figure 7.10a, 7.10b), the regressions of KMO→MARKOR (regression weight=0.380, C.R.=4.953), KMO→LEARNOR (regression weight=0.625, C.R.=9.907), KMO→INNOVOR (regression weight=0.720, C.R.=15.522) were all statistically significant. Amongst MARKOR, LEARNOR and INNOVOR, KMO had the strongest positive impact on INNOVOR.

The indirect effects of the knowledge management performance model are summarised in Table 8.1. To draw a clearer picture of the impact of innovative orientation on performance, Table 8.2 summarises the indirect effects of innovative orientation on performance

As shown in Table 8.1, there were five paths that depict the overall indirect effect of knowledge management orientation on performance. The strongest mediation effect was made by market orientation, the indirect effect of KMO→ MARKOR→Performance being 0.125. Other indirect effects included KMO→ INNOVOR→NPD (0.156), KMO→ INNOVOR→ LEARNOR→ MARKOR→ Performance (0.011), KMO→ INNOVOR→ MARKOR→ Performance(0.059), KMO→LEARNOR→ Performance (0.047). Therefore, the total effect of knowledge management orientation on performance was 0.398.

The above statistical findings indicate that the direct link between knowledge and performance might not always exist. The few empirical studies that exist focus on the links between knowledge and performance often stop with proxies; not at the bottomline financial outcomes, but at the proxies, such as employee learning, and productivity etc. (Kalling, 1993). It is evident that although organisational activities always require knowledge, all knowledge is not always used. And even if it is, it might not result in financial outcomes, due to side effects or because managers and staff are not keen enough on using it. The conversion of knowledge into improved performance is not automatic, but subject to the development of a few critical factors, such as innovation, market orientation, and learning orientation of the organisation. In this research, these were empirically tested and revealed by several indirect effect of knowledge management orientation on performance, as illustrated in Table 8.1. The implications of these indirect influences are that knowledge exists in every organisation. However, acquiring and storing knowledge does not necessarily lead to improved performance. An organisation needs to learn to effectively manage knowledge. The most important challenge is to align knowledge management with other aspects of organisational capabilities, i.e. knowledge management must not be a stand-alone activity or one-off organisational initiative. An organisation's knowledge management capability should be able to facilitate its market-oriented activities and innovations. It is in the strategic development of knowledge management, learning, market orientation and innovation capabilities that leads to improved performance. This understanding supports and provides further insights to the positional advantage view on performance measurement. An organisation's knowledge management capability leads to higher levels of innovative capability, learning capability and market orientation. Through market orientation and new product development, an organisation's capabilities of knowledge management, innovativeness, and organisational learning are effectively transferred to marketplace competitive advantage and therefore performance outcomes. Hence, knowledge management orientation is an antecedent to organisational innovativeness, organisational learning and market orientation.

Table 8.1 The Knowledge Management Performance Model: The Indirect Paths

		Regression weight*		Regression weight*		Regression weight*		Regression weight*		Indirect Effect (I)**	Indirect Effect (II)**	Reference
1	KMO	0.380 → 0.852	MARKOR	0.329 → 0.539	Performance					0.125	0.459	Table 7.10 Table 7.3
2	KMO	0.625 → 0.971	LEARNOR	0.229 → 0.860	MARKOR	0.329 → 0.468	Perform			0.047	0.390	Table 7.10 Table 7.5
3	KMO	0.720 → 0.866	INNOVOR	0.678 → 0.701	NPD	0.319 → 0.359	Perform			0.156	0.218	Table 7.10 Table 7.7
4	KMO	0.720 → 0.937	INNOVOR	0.248 → 0.850	MARKOR	0.329 → 0.487	Perform			0.059	0.388	Table 7.10 Table 7.8
5	KMO	0.720 → 0.975	INNOVOR	0.194 → 0.956	LEARNOR	0.229 → 0.872	MARKOR	0.329 → 0.454	Perform	0.011	0.369	Table 7.10 Table 7.9
	Total (I)									0.398		

Note:

* Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

** Indirect Effects (I) are based on statistical outputs from the full structural model as illustrated in Figure 7.10a, 7.10b, and Table 7.10. While Indirect Effects (II) are based on the individual sub-models as demonstrated from Section 7.3 to Section 7.9.

Table 8.2 The Indirect Effect Of Innovative Orientation On Performance

Path		Regression weight*		Regression weight*		Regression weight*		Indirect Effect (I)**	Indirect Effect (II)**	Reference
1	INNOVOR	0.678 → 0.701	NPD	0.319 → 0.359	Perform			0.216	0.252	Table 7.10 Table 7.7
2	INNOVOR	0.194 → 0.956	LEARNOR	0.229 → 0.872	MARKOR	0.329 → 0.454	Perform	0.015	0.378	Table 7.10 Table 7.9
3	INNOVOR	0.248 → 0.850	MARKOR	0.329 → 0.487	Perform			0.082	0.414	Table 7.10 Table 7.8
	Total (I)							0.313		

Note:

* Regression weight is significant at 95% confidence level (i.e. critical ratio (t-value) is above 1.96).

** Indirect Effects (I) are based on statistical outputs from the full structural model as illustrated in Figure 7.10a, 7.10b, and Table 7.10. While Indirect Effects (II) are based on the individual sub-models as demonstrated from Section 7.3 to Section 7.9.

8.4 CONCLUSIONS

This chapter reported findings in relation to the measurement models and the structural model. Through data analysis of the measurement models, the constructs of knowledge management orientation, innovative orientation, learning orientation and market orientation were tested. Convergent and discriminant validity as well as reliability of these constructs were established to ensure the effective incorporation of the measurement constructs in the structural model. Through the structural model and the individual path analyses, the causal relationships between knowledge management orientation, innovative orientation, learning orientation, market orientation and performance were tested and validated. It was found through the structural model that an organisation's capability in knowledge management greatly improves its innovativeness, organisational learning and market orientation. An organisation's knowledge management program and efforts must keep an close focus on innovation, learning outcomes, and market orientation in order to improve business performance, since knowledge management orientation itself does not necessarily lead to better performance. Moreover, the innovative efforts of an organisation should be directed to better customer value and development of new products in order to effectively transform skills and capabilities into marketplace competitive advantage.

Chapter Nine

Conclusions, Limitations, and Recommendations

For Further Research

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9.1 INTRODUCTION

This chapter reports the final conclusions of this research, following a systematic development of a quantitative research. Chapter 1 introduced research backgrounds and laid out research objectives. Chapter 2 reviewed literature on knowledge and knowledge management. By redefining knowledge management from the capability-based view, Chapter 2 identified five factors that constitute the knowledge management orientation construct. Chapter 3 reviewed literature on business performance and followed the perspective of positional advantage that postulates that organisational capabilities such as market orientation, organisational learning and innovativeness are important to improve business performance. It is through the transformation of these organisation-based capabilities into marketplace-based customer values that organisations achieve sustainable competitive advantage. Each aspect of these identified capabilities was systematically reviewed. In the course of doing this, five factors were identified to construct the measurement of organisational innovative orientation. Chapter 4 further reviewed literature with a focus of identifying the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance. The literature review covered both theoretical foundations and existing empirical research findings. Research hypotheses were developed and the research model was formulated. Chapter 5 illustrated chosen research design and methodology, based on an extensive review of research methods. Survey instrumentation and administration was also reported in Chapter 5. Chapter 6 reported data analysis of the measurement models that were developed in Chapter 2 and 3, using structural equation modeling. Convergent and discriminant validity and reliability of measurement constructs were established. Chapter 7 reported data analysis of the structural model that was hypothesised in Chapter 4. Causal relationships between variables were established. Chapter 8 elaborated discussion on research findings from the previous chapters.

This chapter first reviews main research objectives and outlines the research outcomes. The final research model that was systematically developed and tested is summarised in this chapter. The contribution towards knowledge and implications of research findings are explicitly demonstrated from both academic and pragmatic perspectives. Limitations of this research and recommendations for further study are noted.

9.2 OVERVIEW OF STUDY OBJECTIVES AND OUTCOMES

The main purpose of this research is to identify the relationships between knowledge management orientation, learning orientation, innovative orientation, market orientation and performance. This interest arises from the knowledge-based view, which suggests that knowledge management is critical for business success and knowledge is the only source of sustainable competitive advantage in the fast changing, highly competitive economy. On the other hand, studies on performance measurement have increasingly recognised that the bottomline 'hard' criteria of financial performance are not sufficient to depict an organisation's real performance and cannot be used on their own to predict an organisation's competitive position in the marketplace. The resource-based view and subsequently the viewpoint of positional advantage suggest that organisational skills and capabilities are the source of competitive advantage. It is through the transformation of organisational capabilities into delivery of superior customer values that an organisation attains its competitive advantage. Authors such as Hult and Ketchen (2001) suggest that the interaction between market orientation, learning orientation and innovative orientation leads to superior performance. Knowledge management is considered imperative in building up and strengthening organisational capabilities (Bierly and Chakrabarti, 1996; Lei et al 1996). Therefore, it is this research's interest to identify the role of knowledge management capability in improving performance, and its role in joining the synergies of other aspects of organisational capabilities as mentioned previously.

To achieve the above main research objective, this research first developed an effective measurement of knowledge management orientation and innovative orientation. Within the existing literature, learning orientation and market orientation has been established both theoretically and empirically. The fact that there is not an effective measurement construct for either knowledge management orientation or innovative orientation is a key reason for the ambiguity and contradiction of research findings in these fields. Effective measurement constructs are imperative to identify and clarify relationships between the measured concepts.

Through the discussion in the previous eight chapters, the above objectives were examined through systematic development following quantitative research criteria. To identify the factors underlying either knowledge management orientation or innovative orientation respectively, extensive literature review were conducted in Chapter 2 and 3. The hypothesised measurement models were subsequently tested using confirmatory factor analysis, which provides strong evidence for convergent validity of both measurement models, as entailed in Chapter 6. The discriminant validity of all measurement constructs was tested and established using Pearson correlation coefficient. The reliability test of Cronbach's alpha value for each measurement model and its factors were also reported in Chapter 6. A summary of model fit indices of each measurement model was included at the end of Chapter 6.

The identification of causal relationships between knowledge management orientation, learning orientation, innovative orientation, market orientation and performance was performed using structural equation modeling. Details were illustrated in Chapter 7. In summary, Chapter 4 proposed 18 research hypotheses encompassing both direct and indirect linkages between all variables. As summarised in Table 7.11, 5 hypotheses were rejected, and 13 hypotheses cannot be rejected. Details of hypotheses testing can also be viewed from Figure 9.1. The final structural model (as shown in Figure 7.10a, 7.10b and Table 7.10) demonstrated very good model fit in the strictest sense (Chi-square statistics=10.104, chi-square/df=1.443, degree of freedom=7, p=0.183, GFI=0.987, RMSEA=0.046, PCLOSE=0.482, PGFI=0.247, NFI=0.989, CFI=0.996, RMR=0.032, AGFI=0.947, NCP=3.104).

The attainment of research objectives follows a systematic approach. As quantitative research requires a theoretical model to be specified a priori, all the measurement models and the structural model were generated and developed from strong theoretical basis and empirical findings. A survey questionnaire was used. All precautions were taken to ensure the maximised representativeness of the sample as described in Chapter 5 Research Design and Methods. Structural equation modeling was employed to achieve convergent validity and predictive validity of research models. Other statistical analyses such as Cronbach's reliability test and Pearson correlation coefficient were used to test reliability and discriminant validity of measurement constructs. Finally, research hypotheses and models were tested in Chapter 7. Overall, this research has achieved its designated objectives, i.e. to set up effective measurement constructs for knowledge management orientation and organisational innovative orientation, and to identify the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation, and performance. Thereby, the influence of knowledge management in building up organisational capabilities was effectively tested through this research.

9.3 PROPOSED MODEL OF KNOWLEDGE MANAGEMENT PERFORMANCE

Figure 9.1 is a summary of the structural model with indications of regression weights and critical ratios (t-value), as well as overall model fit indices. From this model, it can be evidenced that knowledge management has direct impact on market orientation, learning orientation, and innovative orientation. The role of knowledge management is not only to ensure that knowledge is effectively managed, but also to ensure that organisations are strengthened in terms of learning capability, innovative capability and market orientation. This finding is consistent with discussions made by other authors that knowledge management is central in process innovation (Earl, 2001), organisational learning (Cohen and Levinthal, 1990) and market orientation (Kohli and Jaworski, 1990).

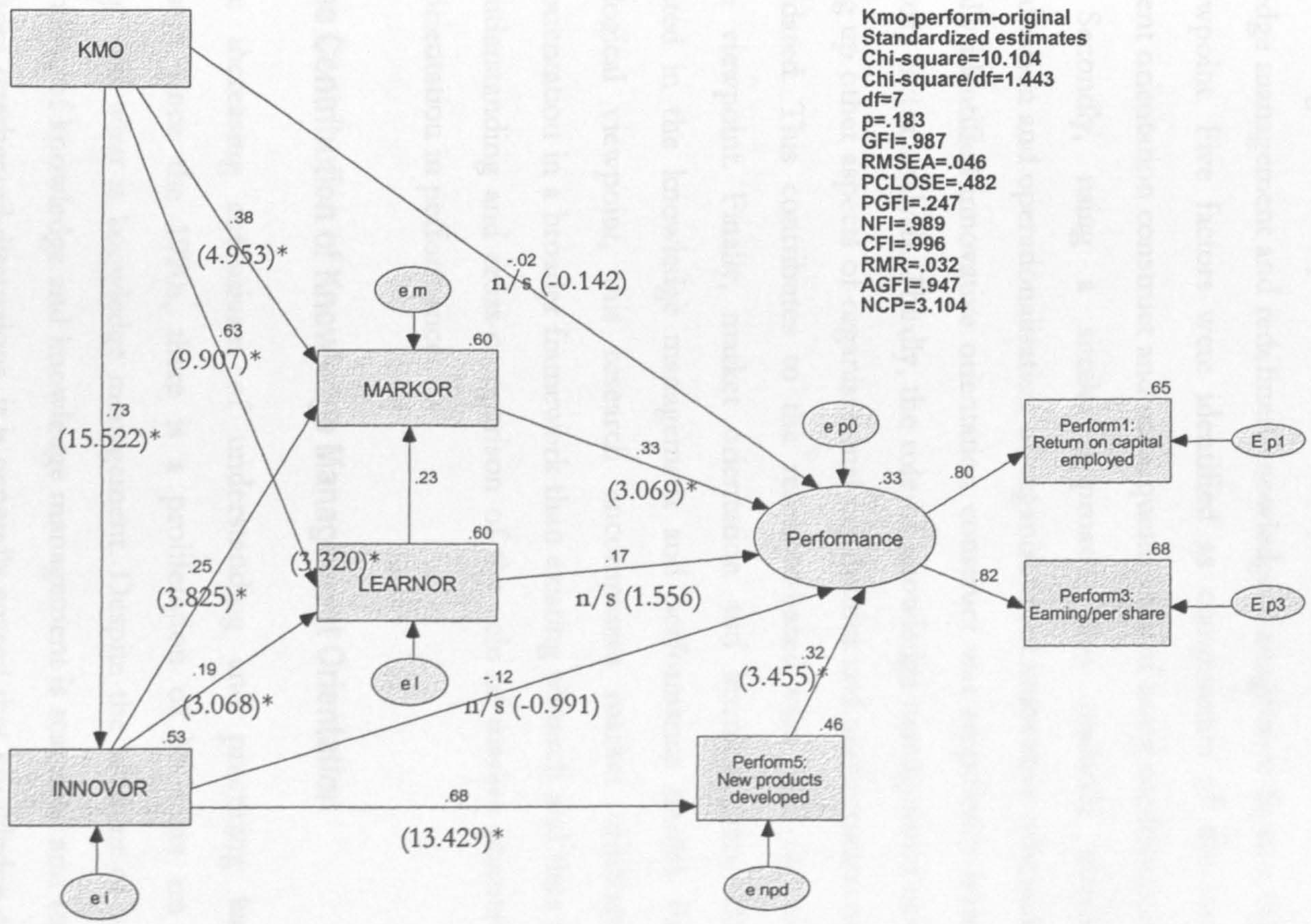
Market orientation was found in this research to directly impact performance. This is consistent with majority of research on market orientation and performance, and supports the conceptual thinking that being market oriented drives an organisation's ability to create superior value for customers, and consequently leads to sustainable competitive advantage (Narver and Slater, 1990).

However, it was found in this research that learning orientation and innovative orientation do not have direct impact on performance. These findings to some extent contradict existing theoretical and empirical research. For example, from the theoretical aspect, learning is deemed to be a key to competence development (Drejer, 2000), and it is through behavioural changes that organisational learning leads to better performance (Fiol and Lyles, 1985; Garvin, 1993; Senge, 1990; Sinkula, 1994). From the empirical level, Hult and Ketchen (2001) found that although learning orientation has direct impact on performance, the impact was less important than that of market orientation or innovative orientation. Therefore, they suggested that the impact of learning orientation on performance is better understood in conjunction with other capabilities. The results of this research indicated that learning orientation must first lead to market-oriented behavioural changes in order to engender improved performance. The impact is indirect and mediated by market orientation. Another reason that may explain the difference in research findings is that the use of different criteria for bottomline performance. For example, Hult and Ketchen (2001) used three items: five-year average change in return on investment, income and stock price. Other findings clarify and support Hult and Ketchen's proposition that learning orientation must be used in conjunction with other capabilities.

The relationship between innovativeness and performance was further explored by incorporating new product development and market orientation as mediators respectively. It was found that new product development had a strong mediation effect on the impact of innovativeness on performance. This can be explained from the theoretical level, because innovative orientation measures an organisation's innovative capabilities and indicates the propensity to innovate. It is through new product development that the innovative capabilities are transferred into superior customer values in the marketplace. This in turn leads to the understanding of market orientation as a mediator between innovative orientation and performance. In a sense, it is through market orientation that an organisation is able to convert its distinct capabilities into marketplace competitive advantage.

Having illustrated the above effects of organisational capabilities on bottomline performance, this research arrived at the conclusion that knowledge management orientation plays a role in building up an organisation's capabilities of market orientation, learning orientation, and in particular innovative orientation. However, each of the above capabilities does not necessarily lead to immediate improvement in organisational performance. The bottomline performance is achieved through two types of marketplace efforts: (1) Continuous improvement in delivering better customer values through collecting customer information, marketplace changes and disseminating knowledge throughout the organisation. Most importantly, the organisation must be responsive to changes and swift in adjusting their products and services. This is reflected in the market-oriented capability. (2) Another route to better performance is via new product development. New product development represents a higher level of radicalness of changes compared to the first route of better customer value. New product development requires an organisation's constant focus on innovations, and occurs as an outcome from a combination of innovative behaviour and activities. It is embedded in behavioural innovativeness and process innovativeness. Additionally organisations must maintain a strong strategic innovative intent and direct behavioural and process changes towards delivering new products in existing markets or opening up new markets. New product development is the result of knowledge recreation and recombination. The above two routes to better performance as empirically evidenced in this research are intrinsically linked to effective knowledge management. Knowledge acquisition, dissemination, refinement, recombination and recreation are imperative in achieving distinctive organisational capabilities in innovativeness and market orientation.

Figure 9.1 A Summary Of Direct And Indirect Relationships Between Variables



Note: 1. Figures in parenthesis are critical ratios (t-value) for the standardised regression weights.
2. Critical ratio (t-value) with * is above 1.96, indicating that the regression is significant at 95% confidence level.

9.4 CONTRIBUTIONS OF THIS RESEARCH

This research makes several significant contributions towards research and theory of knowledge management and performance. Firstly, this research clarified the concept of knowledge management and redefined knowledge management from a capability-based viewpoint. Five factors were identified as components of the knowledge management orientation construct and subsequently tested using confirmatory factor analysis. Secondly, using a similar approach, this research clarified the conceptualisation and operationalisation of organisational innovative orientation. The theoretically identified innovative orientation construct was empirically tested using confirmatory factor analysis. Thirdly, the role of knowledge management orientation in building up other aspects of organisational capabilities and performance outcomes was elucidated. This contributes to the resource-based view and the positional advantage viewpoint. Finally, market orientation and learning orientation were incorporated in the knowledge management and performance model. From the methodological viewpoint, this research encompasses market orientation and learning orientation in a broader framework than existing research and thus provides further understanding and cross-comparison of the role of market orientation and learning orientation in performance.

9.4.1 The Contribution of Knowledge Management Orientation

With the increasing enthusiasm of understanding and practicing knowledge management since the 1990s, there is a proliferation of literature on what is knowledge and what is knowledge management. Despite the amount of work, the understanding of knowledge and knowledge management is scattered and sometimes biased. From overheated discussions, it is generally agreed that knowledge cannot be segregated from people, and knowledge management is not a synonym of information management. However, what are the main aspects of knowledge management and how to measure knowledge management remained unsolved. This lack of understanding restrained further research, especially with respect to the impact of knowledge management on organisational capabilities and outcomes.

Unlike the majority of previous research that examined knowledge management from the process-based view, i.e. studying the processes of knowledge capturing, knowledge storage, knowledge retrieval, knowledge usage, and knowledge creation, etc. (see De Jarnett, 1996; Quintas et al 1997; Brooking, 1997; Pemberton and Stonehouse, 2000), this research defined knowledge management from the capability-based view and identified five factors that affect effective knowledge management. These are the knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking. These five factors encompass the perspectives of managing people, managing technology and managing processes as a holistic interaction.

At the empirical level, the knowledge management orientation construct was tested for its convergent and discrimiant validity, as well as reliability. The convergent validity was attained by adopting a model generation strategy using confirmatory factor analysis. An initial 30 items were partitioned into five factors, and were tested through confirmatory factor analysis. After data pruning, the final measurement model of knowledge management orientation consisted of 20 items, each of which loaded very well onto its respective factor. There was no cross loading of the variables. The five factors also converged into a general factor: knowledge management orientation. Details are reported in Chapter 6. The discriminant validity was tested using Pearson Correlation Coefficient. The coefficients between any two of the factors varied differently and there was not a single coefficient that encompassed 1.0. The reliability of these five factors and the general knowledge management orientation factor was tested. Cronbach's alphas for the five factors were all above 0.7, and for the general factor was above 0.9.

This research is the first one to define knowledge management from a capability-based view and identify the factors that construct an effective measurement of knowledge management orientation. From the above discussion, it can be seen that the construct achieved strong convergent and discriminant validity, as well as reliability. This will contribute to further empirical research in relation to knowledge management.

9.4.2 The Contribution of Innovative Orientation

Unlike knowledge management, which is a field that has only arisen during the last decade, innovation has a long-standing interest in research. Unfortunately, little research in the field encompassed a holistic construct of innovativeness, which explains the ambiguity and contradiction of research findings. It is commonly believed that innovation has various forms, such as product or process innovation, radical or incremental innovation, administrative or technological innovation (Zaltman et al 1973). The complex nature of innovation results in existing studies typically examining only one aspect of innovation, such as product innovation, leaving out the overall measurement of an organisation's innovative capability. Filling in the gap of an effective measurement construct of organisational innovativeness is an imperative to allow comparison of research findings in innovation studies.

This research clarified the concept of organisational innovativeness and identified five factors of the construct: product innovativeness, process innovativeness, market innovativeness, behavioural innovativeness and strategic innovation. Following a similar approach to confirmatory factor analysis of the knowledge management orientation construct, the final innovative orientation construct consisted of 20 variables partitioning into these five factors. Using a similar approach, strong convergent and discriminant validity of the innovation orientation construct were attained. The reliability of the five factors was all above 0.6, and the reliability of the general innovative orientation construct was above 0.9. Thus the innovative orientation construct was empirically tested and established and will contribute to further research by providing clarification of the construct and defining it to encompass the fundamental diverse facets of innovation. Thus this research will also facilitate cross comparison of innovativeness studies.

9.4.3 The Contribution of Knowledge Management Performance

The impact of knowledge management on performance has been rather ambiguous in both academic research and industrial practices. In the existing literature, there is little empirical research on knowledge management and performance. In reality, failure to achieve return on investment on knowledge management programs cast doubts on knowledge management efforts. Whether and how knowledge management impacts on performance or leads to organisational competence improvement is of prime interest to both academia and industry.

Through logically constructed quantitative study utilising structural equation modeling, this research identified that knowledge management has a strong direct positive impact on organisational learning, market orientation and innovative orientation. Knowledge management did not lead to better performance in a straightforward manner. Instead, performance outcomes were directly affected by market orientation and new product development. As discussed previously, this indicated that performance was achieved via two marketplace based competence: one was the market orientation, which focuses on collecting customer information, disseminating knowledge across organisation and responding to marketplace changes. This is commonly conducted in an incremental manner. The other competence was new product development as the outcome of combining behavioural and process innovativeness with strategic innovative orientation. Compared to the first approach, the outcome of the second one is of a radical nature, in the sense that it leads to development of innovative products or services. In spite of the fact that knowledge management was found not to impact performance directly, its role cannot be neglected. It is clear that knowledge management is imperative in building the market orientation capability, innovative orientation capability and learning orientation capability. Market orientation, learning, and innovative orientation are essentially capabilities involving knowledge acquisition, dissemination, usage, recombination and recreation.

The above arguments contribute to the resource-based view and the positional advantage viewpoint. Market orientation, learning orientation, and innovative orientation have been regarded as distinctive organisational capabilities that may be able to be transferred to marketplace competitive advantage and create superior performance (Hult and Ketchen, 2001). However, knowledge management orientation has been neglected from previous research. The research findings of this research suggest an essential role of knowledge management orientation in facilitating and strengthening other distinctive organisational capabilities such as market orientation, learning orientation and innovative orientation. These findings support the positional advantage viewpoint.

9.4.4 The Contribution of Market Orientation and Learning Orientation

Market orientation and learning orientation have been both well researched from both theoretical and empirical levels. Market orientation was found to be strongly related to performance (Jaworski and Kohli, 1993; Narver and Slater, 1990; Slater and Narver, 1994). The relationship of market orientation and performance was mediated by business contexts (Narver and Slater, 1990), and strategic type (Matsuno and Mentzer, 2000). Market orientation was also found to be related to learning orientation (Sinkula et al 1997). Learning orientation had a significant impact on performance in Farrell's (2000) study. However the relationships between knowledge management orientation and learning orientation or market orientation remained unclear. Existing discussions were focused at the conceptual level. Theoretically, authors reckoned that knowledge management is intrinsically linked to market orientation (Darroch and McNaughton, 2002), and learning orientation (Cohen and Levinthal, 1990).

Thus, there was a need to examine the above mentioned relationships at the empirical level. This research encompassed both market orientation and learning orientation and found out that knowledge management orientation had strong direct positive impact on both market orientation and learning orientation. This provides supportive evidence for theoretical arguments and broadens the scope of research in the field of market orientation and learning orientation.

9.5 RESEARCH IMPLICATIONS

The above summarised the main objectives and outcomes achieved. The research findings were discussed in the context of existing body of knowledge and contributions to knowledge were elaborated. The research findings also had other implications for academic research and industrial practices.

9.5.1 Academic implications

In terms of academic research, this study has not only made a significant contribution to knowledge in its immediate discipline (i.e. knowledge-based view), but also has implications to the wider body of knowledge. For example, the positional advantage viewpoint, the resource-based view, and innovation research.

The findings discussed above have a number of implications for management theorists. Firstly, this research provides scope for academic theorists to operationalise the concept of knowledge management through the knowledge management orientation construct. The measurement of knowledge management performance is currently restricted to outcomes at the project level, i.e. a ratio is calculated for input and output of individual knowledge management programs. This provides a narrow or even biased view of knowledge management performance. This study shows that the impact of knowledge management is more indirect and it is through strengthening the market-oriented, learning and innovative capabilities that knowledge management impacts on performance. The knowledge management orientation constructs enables systematic and in-depth studies on knowledge management performance.

On a similar basis, the innovative orientation construct empirically established in this research enables an assessment of an organisation's overall innovative capability, replacing unidimensional studies, which create barriers for cross- examining research on innovativeness. Indeed, both knowledge management orientation and innovative orientation constructs broaden the scope of extant research. The academic implication is that an effective operational construct, one that captures all the main dimensions of the concepts and allows for better investigation of underlying relationships. Focusing on a single or partial dimension of the concept inevitably leads to bias research results.

This research, also, opens up the scope of research in the field of sustainable competitive advantage, the resource-based view, or the positional advantage viewpoint. Till today, theories focus on market orientation, learning orientation and innovative orientation as distinctive capabilities that can eventually lead to sustainable competitive advantage. However, knowledge management as a distinctive capability has largely been neglected from empirically research. Incorporation of knowledge management orientation enriches the positional advantage viewpoint and enhances the understanding of sources of sustainable competitive advantage. An academic implication arising from this study is that it highlights knowledge management as an antecedent to organisational capabilities. Additionally, this study expands the study of interactions between different organisational capabilities, which may be fundamental in understanding superior performance.

9.5.2 Managerial implications

The implications of this research for industrial practices are multiple faceted. First of all, it shows that knowledge management is not simply information management. Building knowledge management capabilities is not just investing in information technology and setting up database. Based on systematic theoretical study and empirical testing, this research identified five aspects of effective knowledge management. They are the knowledge system, knowledge sharing, organisational memory, a learning culture and knowledge benchmarking. Investing in information technology improves the knowledge system. However, the main function of knowledge management is to activate organisational memory and promote knowledge sharing. The knowledge system should be designed to facilitate the memory systems and knowledge sharing. An underlying factor is a learning culture. A learning culture features transparency, issue orientation, accountability, fair reward systems and incentives, and therefore builds trust among organisational members. Trust is essential for people to contribute to organisational memory and share knowledge. Another aspect that companies need to pay attention to is knowledge benchmarking with other companies. Through benchmarking, companies can identify their strengths and weakness in knowledge management and learn best practices from others and consequently filling in the gaps. These five aspects are intertwined. For companies to be successful in knowledge management, they need to re-examine their capabilities and practices in these five aspects.

Secondly, companies need to look deeper into their creating their innovative capabilities. New product development improves a company's performance and strengthens its competitive advantage in the marketplace. However, new product development is a consequence of efforts generated from multi-dimensional capabilities as encapsulated in the structural model. For new product development to occur, companies must make efforts to build up their capabilities in product innovativeness, market innovativeness, behavioural innovativeness, process innovativeness, and strategic innovation. Product and market innovativeness is more explicit, whilst behavioural innovativeness, process innovativeness and strategic innovation are more implicit and requires fundamental behavioural changes and reconceptualisation of the business.

Thirdly, companies need to understand that efforts in knowledge management programs may not necessarily result in immediate financial gains. However, knowledge management is imperative for companies to build up their innovative capability, learning capability and market oriented capability, which eventually lead to better performance outcomes. Neglecting knowledge management is likely to drain the source of these distinctive capabilities. Companies need to pay attention to their knowledge management programs, and ensure that efforts on knowledge management are channelled successfully in building their innovative, learning and market-oriented capabilities. Lack of focus in knowledge management programs will result in failure of investment in the right dimensions of knowledge management programs, and this is likely to undermine the formation and strengthening of long-term capabilities for competitive success.

9.6 LIMITATIONS OF THIS RESEARCH

Despite the contributions to knowledge, this research is not free from limitations. No research is perfect. In this particular research, there are several limitations from the perspectives of research design, self-reporting perception measure, questionnaire design and response rate, replication of research findings and generalisation of study, etc. These are reported in detail below.

9.6.1 Research Design

This research followed a logical design for quantitative research. Although efforts were made to ensure that all research models and hypotheses were soundly generated and developed from strong theoretical background and existing empirical research findings, it is no doubt that this research has limitations that any quantitative research is likely to carry. As mentioned in Chapter 5 Research Design and Methodology, for validation and generalisation purposes, it is increasingly popular for researchers to adopt a triangulation research strategy and use multiple research methods from the same or different research paradigms. From this viewpoint, this research can be enriched by incorporating either focus group before finalising the research models and hypotheses, or case studies after the discussions and research findings from the questionnaire survey. Both focus group and case studies can take the researcher into specific organisational contexts to search for insightful and concurrent understanding of issues in relation to knowledge management and performance. However, due to restrictions of resources, these measures were not possible in this research.

9.6.2 Use of Self-Reporting Perception Measure

Another limitation in this research is the reliance on the subjective, self-report indicators to measure the research constructs in the survey questionnaire. Taking the performance measurement as an example, it is commonly agreed that objective indicators such as cost, sales volume, or profitability would improve precision of research findings. However, these measurements are also sensitive and difficult to be remembered precisely at the times by respondents. Additionally, presentation of such questions in the questionnaire would lead to lower response rate. In fact, the survey instrument relied wholly on managers' self-report regarding their perceptions on their knowledge management, organisational learning, market orientation and innovative orientation. Although most researchers argue that these managers are most likely, among the company's employees, to be able to provide an informed and relatively objective judgement about issues at the company level, such perception might be strongly influenced by the respondent's frame of reference and experience with management practices in their company. A solution to this would be to use multiple informants within a company. But the difficulty and cost of doing so has been widely recognised. For this reason, it was not possible for this research due to resource limitations.

9.6.3 Questionnaire Design and Response Rate

The questionnaire for the survey research was rather lengthy. Although efforts were made to present the questionnaire in a more concise and simple way, the total usable response rate was only 14.2%. To improve the response rate, a few measures could have been taken. For example, the questions should have been further reduced and the questionnaire made shorter. A better company database could have been selected. The database used in this research was FAME. A large percentage of mail was returned due to wrong addressee or leaving of addressees, which indicated the lack of up-to-date database. Another measure would have been the inclusion of further incentives. In the survey for this research, the only incentive used was the provision of a summary of the final research report. To many respondents, this was not an incentive enough to spend around 20 minutes filling in the questionnaire.

9.6.4 Replication of Research Findings

The research findings were results of data analysis of a one-off survey research. Due to resource limitations, replication of research findings was not possible for this research. This becomes a weakness of this research. In particular, confirmatory factor analysis of the measurement models was performed using only one sample. Ideally, the measurement models require a series of tests using different samples for replication purposes. The measurement models (i.e. knowledge management orientation and innovative orientation) in this research achieved strong convergent and discriminant validity, as well as reliability. However, further research needs to be taken in the future to replicate these measurement models.

9.6.5 Generalisation of Study

The sample of this study is medium to large organisations based in the UK. Therefore, the generalisability of research findings is limited to large organisations in the UK only. The result of this study may not be applicable to a larger population across cultures. A simple example is that the concept of knowledge and knowledge management is different in the western society from that in the eastern countries, as discussed in Chapter 2. In order to validate and generalise the model, it should be tested using other independent samples. Additional samples would help to determine if the knowledge management and performance model differ from the data set under study. Such comparisons are needed before generalisation of the results can be widely accepted.

9.7 RECOMMENDATIONS FOR FUTURE RESEARCH

This research has concentrated on, and further developed, the knowledge management and performance model, incorporating innovative orientation, new product development, learning orientation, and market orientation as mediators. As illustrated in the overall objectives and outcomes, as well as contribution to knowledge, this research lays down the foundation for further research for examining the dynamic interactions of the above factors in greater detail. The recommendations for future research can be extended to both methodology employed and the substantive findings of this research.

- This research was designed and tested in cross-sectional contexts. It is therefore worthy for future research to identify if industrial contexts moderate the relationships between the concerned factors in the knowledge management and performance model. The same applies to future research in different cultural settings. The sample of this research was collected from UK-based large organisations. Therefore before extending the research findings to companies in other nations, further research is needed. One thing is certain – the robustness of the proposed model would benefit from a larger sample size.

- Another area for further research is the replication of research findings. As previously mentioned, this research used self-report subjective measures. To avoid the frame reference of a single respondent in the company, it is of interest to replicate the research models using multiple informants from each company, or even testing the model within one single company. A side-effect from this later replication is the response rate, since concentrating on a more homogeneous sample would encourage respondent to participate. Clearly, further research needs to be conducted to replicate and check the findings of this research.

- It would also be of interest to further explore the relationships between knowledge management orientation, innovative orientation, learning orientation and market orientation. As discussed in Chapter 4, the relationships between these factors are complex. The research model of this paper only reveals partial interactions between them. For example, whether market orientation actually impacts on learning orientation, knowledge management orientation, or innovative orientation is also of interest. Therefore, future research may focus on identifying the interactions of these factors.

- Due to the restriction of sample size, the structural model of this study as illustrated in Figure 7.10a and 7.10b cannot be strictly tested incorporating all the sub-components and variables of each component. There would be 74 items in the structural model. Following the statistical rules of thumb of 10-20 cases per variable, a sample size of 740 to 1480 cases would be required to perform the strict structural equation model. Therefore the hypotheses of this study were tested through individual sub-structural models as illustrated in Chapter 7. Further research would be particularly of interest to collect large enough sample to test the full structural model in the strictest approach.

- Another aspect that would be interest for further research is the nested model of the structural model. Nested models are hierarchically related to one another in the sense that their parameter sets are sub-sets of one another (i.e. particular parameters are freely estimated in one model, but fixed to zero in a second model) (Bentler & Zhou, 1987; Bollen, 1989). In relation to this research, nested models can be explored by fixing either KMO→Performance, LEARNOR→Performance, or INNOVOR→ Performance to further assess the goodness-of-fit of competing models. This would be of interest for further research.

9.8 CONCLUDING REMARKS

A key distinctive feature of this research is the establishment of a knowledge management performance model through a large-scale survey research, whilst previous research only measured knowledge management outcomes at the level of individual projects. This research, through extensive literature review, identified the measurement models for knowledge management orientation and innovative orientation and subsequently tested their validity and reliability. Based on theories and existing research findings, the structural model was developed and focused on the relationships between knowledge management orientation, learning orientation, market orientation, innovative orientation and performance. Through structural equation modeling, it was found that the direct impact on performance occurs through either market orientation or new product development. Knowledge management orientation, learning orientation and innovative orientation did not have direct impact on performance. However, learning orientation or innovative orientation had indirect impact on performance mediated by market orientation respectively. The impact of innovative orientation on performance was also mediated by new product development. Knowledge management orientation had strong direct positive impact on innovative orientation, market orientation, and learning orientation respectively. This essentially indicated that knowledge management orientation is the key to build up distinctive organisational capabilities such as market orientation and innovative orientation, which eventually lead to better performance outcomes.

The limitations of this research mainly involved the restriction within quantitative approaches, namely usage of subjective, self-reporting perception measures, relatively lower response rate, replication of research findings and generalisation of study, etc. Recommendations for future research were made based on the research findings, whilst bearing in mind the limitations. The findings of this research hold implications for both academic research and business practices. From the academic viewpoint, this research contributed to the establishment of knowledge management orientation and innovative orientation constructs, which provide frameworks for future research in relevant fields. The research also highlighted the relationship of knowledge management to other organisational capabilities. By doing so this research incorporated knowledge management orientation into the positional advantage framework. This broadens the horizon of academic research in this discipline, and enriches research in market orientation and learning orientation. The practical implications are more in terms of suggestions that companies need to re-examine their knowledge management practices along the dimensions of knowledge system, organisational memory, knowledge sharing, a learning culture and knowledge benchmarking. Knowledge management should not be used as a short-term immediate solution to organisational performance, but instead it should be employed to build and strengthen distinctive organisational capabilities that consequently lead to performance outcomes.

References:

Aaker, D. A. (1984), *Strategic Market Management*, John Wiley & Sons, New York, 1st Edition.

Aaker, D. A. (1988), *Strategic Market Management*, 2nd Edition, New York: John Wiley & Sons, Inc.

Aaker, D. A., Kumar, V., and Day, G. S. (1998), *Marketing Research*, 6th Ed. New York; Chichester: John Wiley & Sons, Inc.

Ackerman, M. S. (1996), "Definitional and Contextual Issues in Organizational and Group Memories", *Information Technology & People*, vol.9, no.1, pp10-24.

Ackerman, M. S. and Halverson, C. A. (2000), "Reexamining Organizational Memory", *Communications of the ACM*, vol.43, no.1, January, pp59-64.

Ackerman, M. S. and Malone, T. W. (1990), "Answer Garden: A Tool for Growing Organizational Memory", *Proceedings of the ACM Conference on Office Information Systems*, Cambridge, MA, April 25-27, pp31-39.

Ahmed, P. K., Lim, K. K. and Zairi, M. (1999), "Measurement Practice for Knowledge Management", *The Journal of Workplace Learning*, vol. 11, no.8, pp304–311.

Ajzen, I. (1985), "From Intentions to Action: A Theory of Planned Behaviour" in Kuhl, J. and Beckmann, J. (Eds), *Action Control: From Cognition to Behaviour*, New York: SpringerVerlag, pp11-39.

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Behaviour*, Englewood Cliffs, NJ: Prentice-hall.

Alavi, M. and Leidner, D. (2001), "Knowledge Management and Knowledge Management Systems Conceptual Foundations and Research Issues", *MIS Quarterly*, vol.25, no.1, pp107-136.

Ali, A., Krapfel, R. Jr. and Labahn, D. (1995), "Product innovativeness and entry strategy: Impact on cycle time and break-even time", *The Journal of Product Innovation Management*, vol.12, no.1, pp54-70.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996), "Assessing the Work Environment for Creativity", *Academy of Management Journal*, vol.39, no.5, pp1154-1184.

American Productivity & Quality Center (1996), *Knowledge Management, a Consortium Benchmarking Study Final Report*, Houston, TX.

Amit, R. and Schoemaker, P. J. H. (1993), "Strategic Assets and Organizational Rent", *Strategic Management Journal*, vol. 14, no.1, pp33-46.

Anand, V., Manz, C. C. and Glick, W. H. (1998), "An Organisational Memory Approach to Information Management", *Academy of Management Review*, vol.23, no.4, pp796-809.

Anderson, J. C. (1987), "An Approach for Confirmatory Measurement and Structural Equation Modeling of Organizational Properties", *Management Science*, vol.33, April. Pp525-541.

Anderson, J. C. and Gerbing, D. W. (1988), "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach", *Psychological Bulletin*, vol.103, no.3, pp411-423.

Andrews, J. and Smith, D. C. (1996), "In Search of Marketing Imagination: Factors Affecting the Creativity of Marketing Programs for Mature Products", *Journal of Marketing Research*, vol.33, May, pp17-37.

Andrews, K. (1971), *The Concept of Corporate Strategy*, Dow Jones-Irwin, Homewood, IL.

Ansoff, H. I. (1965), *Corporate Strategy*, McGraw-Hill, New York.

Arbuckle, J.L. (1997), *AMOS User's Guide*, Chicago, IL: SPSS, Inc.

Argyris, C. & Schon, D. (1978), *Organisational Learning: A Theory of Action Perspective*, Addison-Wesley, New York, NY.

Argyris, C. & Schon, D. (1996), *Organisational Learning II: Theory, Method and Practice*, Addison Wesley, Reading, MA.

Armstrong, J. S. and Overton, T. S. (1977), "Estimating Nonresponse Bias in Mail Surveys," *Journal of Marketing Research*, vol. 14, pp396-402.

Ashok, S. (1996), "Innovativeness: Redefining the Concept", *Journal of Engineering and Technology Management*, vol.13, no.3,4, pp223-243.

Atuahene-Gima, K. (1995), "An Exploratory Analysis of the Impact of Market Orientation on New Product Performance: A Contingency Approach", *Journal of Product Innovation Management*, vol.12, no.4, pp275-293.

Audretsch, D. and Feldman, M. P. (1994), "Knowledge Spillovers and the Geography of Innovation and Production", *Schumpeter Society Conference*, Munster.

Avery, R. D. and Bouchard, T. J., Jr (1994), "Genetics, Twins, and Organizational Behavior", in Staw, B. M. and Cummings, L. L. (Eds), *Research in Organizational Behaviour*, vol.16, JAI Press, pp47-82.

Avlonitis, G. J., Kouremenos, A. and Tzokas, N. (1994), "Assessing the Innovativeness of Organizations and Its Antecedents: Project Innovstrat", *European Journal of Marketing*, vol.28, no.11, pp5-28.

Avlonitis, G. J., Papastathopoulou, P. G. and Gounaris, S. P. (2001), "An Empirically-based Typology of Product Innovativeness for New Financial Services: Success and Failure Scenarios", *The Journal of Product Innovation Management*, vol.18, no.5, pp324-342.

Babbie, E. R. (1979), *The Practice of Social Research*, 2nd Edn, Belmont, Calif: Wadsworth.

Backhouse, R. E. (1998), "If Mathematics is Informal, the Perhaps We Should Accept that Economics Must Be Informal Too", *The Economic Journal*, vol.108, no.451, pp1848-1858.

Badawy, M. K. (1988), "How to Prevent Creativity Mismanagement", *IEEE Engineering Management Review*, vol.16, no.2, pp63.

Bagozzi, R. P. (1984), "A Prospectus for Theory Construction in Marketing", *Journal of Marketing*, vol.48, no.1, pp11-29.

Bagozzi, R. P. and Heatherton, T. F. (1994), "A General Approach to Representing Multifacted Personality Constructs: Application to State Self-Esteem", *Structural Equation Modeling*, vol.1, pp35-67.

Bagozzi, R. P. and Yi, Y. (1988), "On the Evaluation of Structural Equation Models", *Journal of the Academy of Marketing Science*, vol.16, no.1, pp74-94.

Baker, M. J. (1991), *Research for Marketing*, MacMillan Education.

Baker, W. E. and Sinkula, J. M. (1999), "The Synergistic Effect of Market Orientation and Learning Orientation on Organizational Performance", *Journal of the Academy of Marketing Science*, vol.27, no.4, pp411-427.

Bank of England (January 1999) Finance for Small Firms - A Sixth Report

Bank, D. (1996), "The New Worker – Know it Alls", *Wall Street Journal*, Nov.18: R28.

Bannon, L. J. and Kuutti, K. (1996), "Shifting Perspectives on Organisational Memory: From Storage to Active Remembering", in Nunamaker, J. F. and Sprague, R. H. Jr (Eds), *Proceedings of the 29th Annual Hawaii International Conference on Systems Sciences*, IEEE Computer Society Press, Los Alamitos, CA.
Barnard, C. (1938), *The Functions of the Executive*, Harvard University Press: Cambridge, MA, USA.
Barney, J. (1986), "Organizational Culture: Can it be a Source of Sustained Competitive Advantage?" *Academy of Management Review*, vol.11, pp656-665.
Barney, J. B. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management*. vol.17, no.1, pp99-120.
Barrett, F. J. and Peterson, R. (2000), "Appreciative Learning Cultures: Developing Competencies for Global Organizing", *Organization Development Journal*, vol.18, no.2, pp10-21.
Bartlett, C. (1998), *McKinsey & Co.: Managing Knowledge and Learning*, Case Study No.386357, Boston: Harvard Business School Publishing.
Bartlett, C. A. and Ghoshal, S. (1989), *Managing Across Borders: The Transnational Solution*, Boston: Harvard Business School Press.
Bass, F. (1969), "A New Product Growth Model for Consumer Durables", *Management Science*, vol.15, pp215-227.
Bateson, G. (1972), *Steps to an Ecology of Mind*, New York: Ballantine.
Baumgartner, R. M. and Heberlein, T. A. (1984), "Recent Research on Mailed Questionnaire Response Rates", in Lockhart, D. C. (Ed), *Making Effective Use of Mailed Questionnaires*, San Francisco: Jossey-Bass, pp65-79.
Beardsworth, A. D. (1980), "Analysing Press Content: Some Technical and Methodological Issues", in Christian, H. (Ed.), *The Sociology of Journalism and the Press* (Sociological Review Monograph No. 29), Keele, Staffs,: University of Keele, pp371-395.
Beckett, R. C. (2000), "A Characteristics of Corporate Memory", *Journal of Knowledge Management*, vol.4, no.4, pp311-319.
Bell, D. (1973), *The Coming of Post-industrial Society: A Venture in Social Forecasting*, New York: Basic Books.
Bentler, P. M. (1988), "Causal Modeling via Structural Equation Systems", in J. R. Nesselroade & R. B. Cattell (Eds), *Handbook of Multivariate Experimental Psychology*, 2nd Edition, pp317-335, New York: Plenum.
Bentler, P.M. (1992), *EQS Structural Equations Program Manual*. Los Angles: BMDP Statistical Software
Bentler, P. M. and Bonett, D. G. (1980), "Significant Tests and Goodness of Fit in the Analysis of Covariance Structures", *Psychological Bulletin*, vol.88, no.3, pp588-606.
Bentler, P. M. and Chou, C. (1987), "Practical Issues in Structural Modelling", *Sociological Methods and Research*, vol.16, pp78-117.
Besanko, D., Dranove, D. and Shanley, M. (1996), *The Economics of Strategy*, New York: John Wiley & Sons, Inc.
Bettis, R. A., and Prahalad, C. K. (1995), "The Dominant Logic: Retrospective and Extension." *Strategic Management Journal*, vol. 16, pp5-14.
Bhuian, S. N. (1998), "An Empirical Examination of Market Orientation in Saudi Arabian Manufacturing Companies", *Journal of Business Research*, vol.43, no.1, pp13-25.

Bierly, P. and Chakrabarti, A. (1996), "Generic Knowledge Strategies in the U.S. Pharmaceutical Industry", *Strategic Management Journal*, vol.17, Winter, pp123-135.

Bierly, P. E.; Kessler, E. H. & Christensen, E. W. (2000), "Organisational Learning, Knowledge and Wisdom", *Journal of Organisational Change Management*, vol.13, no.6, pp595-618.

Black, T. R. (1993), *Evaluating Social Science Research – An Introduction*, Sage Publications, London.

Blackler, F. (1995), "Knowledge, Knowledge Work and Organizations: An Overview and Interpretation", *Organization Studies*, vol.16, no.6, pp1021-1046.

Bloodgood, J. M. and Salisbury, Wm. D. (2001), "Understanding the Influence of Organizational Change Strategies on Information Technology and Knowledge Management Strategies", *Decision Support Systems*, vol.31, pp55-69.

Blum, M. L. and Foos, P. W. (1986), *Data Gathering: Experimental Methods Plus*, Harper & Row.

Blumentritt, R. and Johnston, R. (1999), "Towards a Strategy for Knowledge Management", *Technology Analysis & Strategic Management*, vol.11, no.3, pp287-300.

Bobrow, D. G. and Collins, A. (Eds) (1975), *Representation and Understanding: Studies in Cognitive Science*, New York: Academic Press.

Boisot, M. (1987), *Information and Organisations: The Manager as Anthropologist*, Fontana/Collins, London.

Boisot, M. H. (1998), *Knowledge Assets: Securing Competitive Advantage in the Information Economy*, Oxford: Oxford University Press.

Bollen, K. A. (1989), *Structural Equations with Latent Variables*, New York: Wiley.

Bolton Committee (1971) Report of the Committee of Inquiry on Small Firms. Cmnd 4811. HMSO, London

Bolwijn, P. T. and Kumpe, T. (1990), "Manufacturing in the 1990s – Productivity, Flexibility and Innovation", *Long Range Planning*, vol.23, pp44-57.

Bontis, N. (2001). "Assessing Knowledge Assets: A Review of the Models Used to Measure Intellectual Capital", *International Journal of Management Reviews*, vol.3, no.1, pp41-60.

Booz, Allen, and Hamilton (1982), *New Products Management for the 1980's*, New York: Booz, Allen, and Hamilton.

Bowonder, B. and Miyake, T. (2000), "Technology Strategy of Toshiba Corporation: A Knowledge Evolution Perspective", *International Journal of Technology Management*, vol.12, nos. 7/8, pp864-895.

Boxwell, R. J. Jr. (1994), Benchmarking for Competitive Advantage, McGraw-Hill, New York, NY.

Breckler, S. J. (1990). "Application of Covariance Structure Modeling in Psychology: Cause for Concern?", *Psychological Bulletin*, 107, 260-273.

Brooking, A. (1997), "The Management of Intellectual Capital", *Journal of Long Range Planning*, Vol.30, No.3, p364-365.

Brown, J. and Duguid, P. (1991), "Organisational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation", *Organization Science*, Vol.2, No.1, p40-57.

Browne, M., & Cudeck, R. (1993), "Alternative Ways of Assessing Model Fit", In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models* (pp.136-162), Newbury Park, CA: Sage.

Bruner, J. S. (1973), *Beyond the Information Given: Studies in the Psychology of Knowing*, Selected, edited and introduced by Anglin, J. M., New York: Norton.

Bryman, A. (1988), *Quantity and Quality in Social Research*, London: Unwin Hyman.

Bryman, A. (1996), "Quantity and Quality in Social Research", *Contemporary Social Research*: 18, Series Edited by Martin Bulmer, Routledge: London and New York.

Bukowitz, W. and Petrash, G. (1997), "Visualizing, Measuring, and Managing Knowledge", *Research Technology Management*, vol.40, July/August, pp24-31.

Byrne, B. M. (1988), "The Self Description Questionnaire III: Testing for Equivalent Factorial Validity across Ability" *Educational and Psychological Measurement*, vol.48, pp397-406.

Byrne, B. M. (1998), *Structural Equation Modeling with LISREL, PRELIS, and SIMPLIS: Basic Concepts, Applications, and Programming*, Mahwah, NJ: Lawrence Erlbaum.

Byrne, B. M. (2001), *Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming, Lawrence Erlbaum Associates, Publishers*, New Jersey.

Camp, R. C. (1989), "Benchmarking: the search for best practices that lead to superior performance. Part I. A definition" *Quality Progress*, pp62-68.

Campbell, J. P. and Freeman, S. J. (1991), "Cultural Congruence, Strength and Type: Relationships to Effectiveness", in Woodman, R. W. and Passmore, W. A. (Eds), *Research in Organizational Change and Development*, vol.5, Greenwich, CT: JAI Press, Inc.

Capon, N., Farley, J. U. and Hulbert, J. (1988), *Corporate Strategic Planning*, New York: Columbia University Press.

Capon, N., Farley, J. U., Hulbert, J. and Lehmann, D. R. (1992), "Profiles of Product Innovators Among Large US Manufacturers", *Management Science*, vol.38, February, pp157-169.

Carneiro, A. (2000), "How Does Knowledge Management Influence Innovation and Competitiveness", *Journal of Knowledge Management*, vol.4, no.2, pp87-98.

Chandrashekaran, M. and Sinha, R. K. (1995), "Isolating the Determinants of Innovativeness: A Split-Population Tobit (SPOT) Duration Model of Timing and Volume of First and Repeat Purchase" *Journal of Marketing Research*, vol.32, August, pp444-456.

Charles, D. and Howells, J. (1992), *Technology Transfer in Europe: Public and Private Networks*, London: Belhaven Press.

Chase, R. (1997), "The Knowledge Based Organisation: An International Survey", *Journal of Knowledge Management*, Vol.1, No.1. pp38-49.

Chau, P. Y. K. and Hui, K. L. (1998), "Identifying Early Adopters of New IT Products: A Case of Windows 95", *Information & Management*, vol.33, no.5, pp225-230.

Chisnall, P. (2001), *Marketing Research*, 6th Edition, The McGraw-Hall Companies.

Christensen, C. M. and Bower, J. L. (1996), "Customer Power, Strategic Investment, and the Failure of Leading Firms", *Strategic Management Journal*, vol.17, no.3, pp197-218.

Churchill, G. A. (1979), "A Paradigm for Developing Better Measures of Marketing Constructs", *Journal of Marketing Research*, vol.XVI, pp63-74.

Churchill, G. A. (1995), *Marketing Research: Methodological Foundations*, 6th Ed. Fort Worth; London: Dryden Press.

Churchill, G. A. Jr. (1979), "A Paradigm for Developing Better Measures of Marketing Constructs", *Journal of Marketing Research*, vol.16, February, pp64-73.

Churchman, C. W. (1971), *The Design of Inquiring System: Basic Concepts of Systems and Organization*, New York: Basic Books, 1971.

Cliff, N. (1983), "Some Cautions Concerning the Application of Causal Modeling Methods", *Multivariate Behavioral Research*, vol.18, no.115-126.

Cohen, L. and Manion, L. (1989), *Research Methods in Education*, 3rd Edn, Routledge.

Cohen, M. D. and Bacdayan, P. (1994), "Organizational Routines are Stored as Procedural Memory: Evidence from a Laboratory Study", *Organization Science*, vol.4, pp554-568.

Cohen, M. D. and Levinthal, D. A. (1990), "Absorptive Capacity: A New Perspective on Learning and Innovation", *Administrative Science Quarterly*, vol.35, no.1, pp128-152.

Cohen, M. D. and Sproul, L. E. (1991), "Editors' Introduction", *Organization Science*, 2 (1), p1-3, (Special Issue on Organisational Learning – Papers in honor of <and by> James G. March).

Cole, A. H. (1946), "An Approach to the Study of Entrepreneurship", *Journal of Economic History*, Suppl. VI. pp1-15.

Collins, H. M. (1993), "The Structure of Knowledge", *Social Research*, vol.60, no.1, pp95-116.

Comery, A. L. (1992), *A First Course in Factor Analysis*, Hillsdale, NJ: Lawrence Erlbaum Associates.

Compeau, D. R. and Higgins, C. A. (1995), "Application of Social Cognitive Theory to Training for Computer Skills", *Information Systems Research*, vol.6, no.2, pp118-143.

Conner, K. (1991), "Historical Comparison of Resource-Based Theory and Five Schools of Thought Within Industrial Organization Economics: Do We Have a New Theory of the Firm?", *Journal of Management.* vol.17, no.1, pp121-154.

Connor, T. (1999), "Customer-led and Market-oriented: A Matter of Balance", *Strategic Management Journal*, vol.20, no.1, pp1157-1163.

Cook, P. (1998), "The Creativity Advantage – Is Your Organisation Leader of the Pack", *Industrial Commercial Training*, vol.30, no.5, pp179-184.

Cook, T. D., and Campbell, D. T. (1976). "The Design and Conduct of Quasi-experiments and True Experiments in Field Settings", In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 223-326). New York: John Wiley and Sons.

Cooper, A. C. (1973), "Technical Entrepreneurship: What do We Know?", *Research and Development Management*, vol.3, pp59-64.

Cooper, H. M. (1984), *The Integrative Research Review: A Systematic Approach*, Beverley Hills; London: Sage.

Cooper, J. R. (1998), "A Multidimensional Approach to the Adoption of Innovation", Management Science, vol.36, no.8, pp493-502.

Cooper, R. G. (1979), "The Dimensions of Industrial New Product Success and Failure", *Journal of Marketing*, vol.43, no.3, pp93-103.

Cooper, R. G. and de Brentani, U. (1991), "New Industrial Financial Services: What Distinguishes the Winners", *Journal of Product Innovation Management*, vol.8, no.1, pp75-90.

Corbett, J. M. (2000), "On Being an Elephant in the Age of Oblivion Computer-based Information Systems and Organizational Memory", *Information Technology & People*, vol.13, no.4, pp282-297.
Coyne, K. (1986), "Sustainable Competitive Advantage: What It is, What It Isn't", *Business Horizons*, vol.29, no.1, pp54-61.
Cozijnsen, A. J., Vrakking, W. J. and Ijzerloo, M. V. (2000), "Success and Failure of 50 Innovation Projects in Dutch Companies", *European Journal of Innovation Management*, vol.3, no.3, pp150-159.
Creswell, J. (1998), *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*, Sage Publications.
Creswell, J. W. (1994), *Research Design: Qualitative & Quantitative Approaches*, Sage Publications, London.
Cronbach, L. and Meehl, P. (1955), "Construct Validity in Psychological Tests", *Psychological Bulletin*, vol.52, no.4, pp281-302.
Daft, R. (1983), *Organization Theory and Design*, New York: West.
D'Agostino, R. B. (1986), "Tests for the normal distribution" in Stephens M.A. and D'Agostino R.B. (Eds), *Goodness-of-fit Techniques*, New York: Dekker, 367-419.
Damanpour, F. and Evan, W. M. (1990), "The Adoption of Innovations Over Time: Structural Characteristics and Performance of Organizations", *Proceedings of National Decision Science Institute Conference*, San Diego.
Danneels, E. and Kleinschmidt, E. J. (2001), "Product Innovativeness From the Firm's Perspective: Its Dimensions and Their Relation with Product Selection and Performance", *The Journal of Product Innovation Management*, vol.18, pp357-373.
Darr, E. D., Argote, L. and Epple, D. (1995), "The Acquisition, Transfer and Depreciation of Knowledge in Service Organizations: Productivity in Franchises", *Management Science*, vol.41, pp1750-1762.
Darroch, J. and McNaughton, R. (2001), "Developing a Measure of Knowledge Management", in Brontis, N. (Ed) *World Congress on Intellectual Capital Readings*, Butterworth-Heinemann, Boston, pp226-242.
Darroch, J. and McNaughton, R.B. (2002), "Examining the Link between Knowledge Management Practices and Types of Innovation", *Journal of Intellectual Capital*, vol. 3, no.3, pp210-222.
Davenport, T. H., Jarvenpaa, S. and Beers, M. (1996), "Improving Knowledge Work Processes", *Sloan Management Review*, vol.37, no.4, pp53-66.
Davenport, T. H.; DeLong, D. W. and Beers, M. C. (1998), "Successful Knowledge Management Projects", *Sloan Management Review*, vol.39, no.2, pp43-57.
Davis, F. D., Bagozzi, R. P. and Warshaw, R. R. (1989), "User Acceptance of Computer Technology: Comparison of Two Theoretical Models", *Management Science*, vol.35, no.8, pp982-1003.
Davis, G. B. and Olson, M. H. (1985), *Management Information System: Conceptual Foundations, Structure and Development*, McGraw Hill, New York, NY.
Day, G. S. (1990), *Market Driven Strategy, Processes for Creating Value*, New York: The Free Press.
Day, G. S. (1991), "Learning About Markets", *Marketing Science Institute Report, No.91-117*, Cambridge, MA: Marketing Science Institute.
Day, G. S. (1992), "Marketing's Contribution to the Strategy Dialogue", *Journal of the Academy of Marketing Science*, vol.20, Fall, pp323-329.

Day, G. S. (1994a), "Continuous Learning About Markets", *California Management Review*, vol.36, Summer, pp9-31.
Day, G. S. (1994b), "The Capabilities of Market-Driven Organizations", *Journal of Marketing*, vol.58, October, pp37-52.
Day, G. S. and Wensley, R. (1988), "Assessing Advantage: A Framework for Diagnosing Competitive Superiority", *Journal of Marketing*, vol.52, April, pp1-20.
De Geus, A. (1988), "Planning as Learning", *Harvard Business Review*, March/April, vol.66, no.2, pp70-74.
De Jarnett, L. (1996), "Knowledge the Latest Thing", *Information Strategy, The Executives Journal*, Vol.12, Part 2, p3-5.
De Long, D. W. and Fahey, L. (2000), "Diagnosing Cultural Barriers to Knowledge Management", *Academy of Management Executive*, vol.14, no.4, pp113-127.
De Vaus, D. A. (1986), *Surveys in Social Research*, London: Allen & Unwin.
Decarolis, D. M. and Deeds, D. L. (1999), "The Impact of Stocks and Flows of Organizational Knowledge on Firm Performance: An Empirical Investigation of the Biotechnology Industry", *Strategic Management Journal*, vol.20, pp953-968.
Degler, D. and Battle, L. (2000), "Knowledge Management in Pursuit of Performance", *Performance Management*, vol.39, no.6, pp25-31.
Demsetz, H. (1991), "The Theory of the Firm Revisited", in Williamson, O. and Winter, S. (Eds), *The Nature of the Firm*, Oxford University Press, New York, pp159-178.
Denzin, N. K. (1978), *The Research Act: A Theoretical Introduction to Sociological Methods*, 2nd Ed. New York; London: McGraw-Hill.
Denzin, N. K. (1989), *The Research Act*, Prentice-Hall, Englewood Cliffs, NJ.
Denzin, N. K. (1989b), *Interpretive Biography*, Newbury Park, CA: Sage.
Denzin, N.K. & Lincoln, Y.S. (1994), *Handbook of Qualitative Research*, Sage Publications, Inc.
Deshpande, R. and Webster, F.E. Jr. (1989), "Organizational Culture and Marketing: Defining the Research Agenda", *Journal of Marketing*, vol.53, January, pp3-15.
Deshpande, R., Farley, J. U. and Webster, F. E. Jr. (1993), "Corporate Culture, Customer Orientation, and Innovativeness in Japanese Firms: A Quadrad Analysis", *Journal of Marketing*, vol.57, January, pp23-37.
Dess, G. G., Lumpkin, G. T. and Covin, J. G. (1997), "Entrepreneurial Strategy and Firm Performance: Tests of Contingency and Configurational Models", *Strategic Management Journal*, vol.18, October, pp677-695.
Dickson, P. R. (1992), "Toward a General Theory of Competitive Rationality", *Journal of Marketing*, vol.56, January, pp69-83.
Dierickx, I. and Cool, K. (1989), "Asset Stock Accumulation and Sustainability of Competitive Advantage", *Management Science*, vol.35, pp1504-1511.
Dillman, D. A. (1978), *Mail and Telephone Surveys: The Total Design Method*, New York: John Wiley and Son.
Dixon, N. M. (1992), "Organisational Learning: A Review of the Literature with Implications for HRD Professionals", *Human Resource Development Quarterly*, vol.3, Spring, pp29-49.
Dodgson, M. (1993b), "Organisational Learning: A Review of Some Literatures", *Organization Studies*, vol. 14, no.3, p375-394.
Dosi, G. (1988), "Sources, Procedures, and Microeconomic Effects of Innovation", *Journal of Economic Literature*, vol.26, September, pp1120-1171.

Dougherty, D. and Hardy, C. (1996), "Sustained Product Innovation in Large, Mature Organizations: Overcoming Innovation-to-organization Problems", *Academy of Management Journal*, vol.39, October, pp1120-1153.

Dove, R. (1999), "Knowledge Management, Response Ability, and the Agile Enterprise", *Journal of Knowledge Management*, vol.3, no.1, pp18-35.

Downs, G. W. Jr. And Mohr, L. B. (1976), "Conceptual Issues in the Study of Innovation", *Administrative Science Quarterly*, vol.21, pp700-714.

Doyle, P. (1998), "Innovate or Die", *Marketing Business*, vol.20, pp3.

Drazin, R. and Schoonhoven, C. B. (1996), "Community, Population and Organisation Effects on Innovation: A Multilevel Perspective", *Academy of Management Journal*, vol.39, no.5, pp1065-1083.

Dreher, A. (1993), "Marketing Orientation: How to Grasp the Phenomenon", *Proceedings of the European Marketing Academy Conference*, May 25-28, Barcelona Spain, pp375-393.

Drejer, A. (2000), "Organisational Learning and Competence Development", *The Learning Organisation*, Vol.7, No.4, p206-220.

Dretske, F. I. (1981), *Knowledge and the Flow of Information*, Cambridge, Massachusetts: MIT Press.

Drew, S.A.W. & Smith, P.A.C. (1995), "The Learning Organisation: 'Change Proofing' and Strategy", *The Learning Organisation*, Vol.2, No.1, pp4-14.

Drucker, P. (1968), *The Age of Discontinuity: Guidelines to Our Changing Society*, New York: Harper & Row.

Drucker, P. (1992), "The New Society of Organizations", *Harvard Business Review*, vol.70, no.5, pp95-104.

Drucker, P. (1993), *Post-Capitalist Society*, Oxford: Butterworth Heinemann.

Drucker, P. (1997), *Innovation and Entrepreneurship*, Butterworth-Heinemann, Oxford.

DTI (1999a) The Small Business Service: A Public Consultation URN 99/185. DTI

Earl, M. (2001), "Knowledge Management Strategies: Toward a Taxonomy", *Journal of Management Information Systems*, vol. 18, no. 1, pp215-233.

Egelhoff, W. G. (1991), Information-processing Theory and the Multinational Enterprise", *Journal of International Business Studies*, vol.22, pp341-328.

El Sawy, O. A. and Bowles, G. (1997), "Redesigning the Customer Support Process for the Electronic Economy: Insights from Storage Dimensions", *MIS Quarterly*, vol.21, no.4, pp457-483.

Epple, D., Argote, L. and Devadas, R. (1991), "Organization Learning Curves: A Method for Investigating Intra-plant Transfer of Knowledge Acquired through Learning by Doing", *Organization Science*, vol.2, pp58-70.

Ettlie, J. E. and Vellenga, D. B. (1979), "The Adoption Time Period for Some Transportation Innovations", *Management Science*, vol.25, no.5, pp429-443.

Fahey, L. and Prusak, L. (1998), "The 11 Deadliest Sins of Knowledge Management", *California Management Review*, vol.40, no.3, pp265-276.

Farrell, M. A. (2000), "Developing a Market-Oriented Learning Organisation", *Australian Journal of Management*, vol.25, no.2, pp201-222.

Farrell, M. A. and Oczkowski, E. (1997), "An Analysis of the MKTOR and MARKOR Measures of Market Orientation: An Australian Perspective", *Marketing Bulletin*, vol.8, pp30-40.

Feldman, M. and March, J. (1981), "Information in Organizations as Signal and Symbol", *Administrative Science Quarterly*, vol.26, pp171-186.

Felton, A. P. (1959), "Making the Marketing Concept Work", *Harvard Business Review*, vol.37, July-August, pp55-65.

Fentress, J. and Wickham, C. (1992), *Social Memory*, Blackwell, Oxford.

Fiol, M. & Lyles, M. (1985), "Organisational Learning", *Academy of Management Review*, Vol.10, No.4, p803-813.

Flynn, L. R. and Pearcy, D. (2001), "Four Subtle Sins in Scale Development: Some Suggestions for Strengthening the Current Paradigm", *International Journal of Market Research*, vol.43, Quarter 4, pp409-423.

Ford, G. T. (1978), "Adoption of Consumer Policies by States: Some Empirical Perspectives", *Journal of Marketing Research*, vol.15, no.1, pp49-??.

Fornell, C. (1982), *A Second Generation of Multivariate Analysis*, Vol.1: Methods, New York: Praeger.

Fornell, C. and Larcker, D. W. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research*, vol.18, February, pp39-50.

Fraenkel, J. R. and Wallen, N. E. (1990), *How to Design and Evaluate Research in Education*, New York; London: McGraw-Hill.

Freeman, M. (1993), *Rewriting the Self: History, Memory and Narrative*, Routledge, London.

Gabel, T. G. (1995), "Market Orientation: Theoretical and Methodological Concerns", In Stern, B. B. and Zinkham, G. M. (eds), *Proceedings of the American Marketing Association Summer Educators' Conference*, Chicago, Il: American Marketing Association, pp368-375.

Galagan, P. (1997), "Smart Companies (Knowledge Management)", *Training and Development*, vol.51, no.12, pp20-25.

Gallivan, M. J. (2001), "Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of a New Framework", *Database for Advances in Information Systems*, vol.32, no.3, pp51-85.

Garud, R. and Nayyar, P. R. (1994), "Transformative Capacity: Continual Structuring by Intertemporal Technology Transfer", *Strategic Management Journal*, vol.15, June, pp365-385.

Garvin, D. A. (1993), "Building a Learning Organisation", *Harvard Business Review*, July/August, pp78-91.

Gatignon, H. and Robertson, T. S. (1986), "Integration of Consumer Diffusion Theory and Diffusion Models: New Research Directions", in Mahajan, V. and Wind, Y. (Eds), *Innovation Diffusion Models of New Product Acceptance*, Cambridge, MA: Ballinger, pp37-60.

Gatignon, H. and Thomas, S. R. (1985), "A Propositional Inventory for New Diffusion Research", *Journal of Consumer Research*, vol.11, March, pp849-867.

Gauzente, C. (1999), "Comparing Market Orientation Scales: A Content Analysis", *Marketing Bulletin*, no.10, http://marketing-bulletin.massey.ac.nz/contents1.asp

Gee, S. (1978), "Factors Affecting the Innovation Time-Period", *Research Management*, vol.21, no.1, pp37-47.

Ghemawat, P (1986), "Sustainable Advantage", *Harvard Business Review*, vol. 64, September-October, 53-58.

Ghoshal, S., Korine, H. and Szulanski, G. (1994), "Interunit Communication in Multinational Corporations", *Management Science*, vol.40, pp96-110.

Glynn, M. A. (1996), "Innovative Genius: A Framework for Relating Individual and Organisational Intelligences to Innovation", *Academy of Management Review*, vol.21, October, pp1081-1111.

Glynn, M., Milliken, F. & Lant, T. (1992), "Learning about Organisational Learning Theory: An Umbrella of Organising Processes", Paper presented at the *Academy of Management Meetings*, Las Vegas, NV.

Gold, A. H., Malhotra, A. and Segars, A. H. (2001), "Knowledge Management: An Organizational Capabilities Perspective", *Journal of Management Information Systems*, Summer, vol. 18, no.1, pp185-214.

Goldsmith, R. E. and Flynn, L. R. (1995), "The Domain Specific Innovativeness Scale: Theoretical and Practical Dimensions", in Moore, D. L. (Ed), *Association of Marketing Theory and Practice Proceedings*, vol.4, pp177-182.

Goldsmith, R. E., Freiden, J. B. and Eastman, J. (1995), "The Generality / Specificity Issue in Consumer Innovativeness Research", *Technovation*, vol.15, no.10, pp601-612.

Goodman, P. and Darr, E. (1996), "Exchanging Best Practices Through Computer-Aided Systems", *The Academy of Management Executive*, vol.10, no.2, pp7-19.

Gorsuch, R. L. (1983), *Factor Analysis*, Hillsdale, NJ: Lawrence Erlbaum Associates.

Goyder, J. C. (1982), "Further Evidence on Factors Affecting Response Rates to Mailed Questionnaires", *American Sociological Review*, vol.47, no.4, pp550-553.

Grant, R. M. (1996a), "Towards a Knowledge-based Theory of the Firm", *Strategic Management Journal*, Vol.17 (Special), p109-122.

Grant, R. M. (1996b), "Prospering in Dynamically-competitive Environments: Organizational Capability as Knowledge Integration", *Organization Science*, vol.7, no.4, pp375-387.

Gray, P. H. (2001), "The Impact of Knowledge Repositories on Power and Control in the Workplace", *Information Technology & People*, vol.14, no.4, pp369-384.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). "Toward a Conceptual Framework for Mixed-method Evaluation Designs", *Educational Evaluation and Policy Analysis*, vol. 11, no.3, pp255-274.

Guba, E. G. (1978), *Toward a Methodology of Naturalistic Inquiry in Educational Evaluation*, Los Angeles: CSE.

Guba, E. G. (1990), *The Paradigm Dialog*, (ed), Newbury Park, Calif.; London: Sage Publications.

Guba, E. G. and Lincoln, Y. S. (1988), *Effective Evaluation*, San Francisco; London: Jossey-Bass.

Gupta, A. K. and Govindarajan, V. (1991), "Knowledge Flows and the Structure of Control within Multinational Corporations", *Academy of Management Review*, vol.16, no.4, pp768-792.

Gupta, A. K. and Govindarajan, V. (1993), "Coalignment between Knowledge Flow Patterns and Strategic Systems and Processes within MNCs", in Lorange, P., Chakravarthy, J. R. and Van De Ven, A. (Eds), *Implementing Strategic Processes: Change, Learning and Cooperation*, pp329-336, Oxford: Blackwell.

Gupta, A. K. and Govindarajan, V. (2000), "Knowledge Management's Social Dimensions: Lessons from Nucor Steel", *Sloan Management Review*, vol.??, Fall, pp71-80.

Hamel, G. and Prahalad, C. K. (1991), "Corporate Imagination and Expeditionary Marketing", *Harvard Business Review*, vol.69, July/August, pp81-92.

Hamel, G. and Prahalad, C. K. (1994), *Competing For the Future*, Boston, Mass., Harvard Business School Press.

Han, J. K., Kim, N. and Srivastava, R. K. (1998), "Market Orientation and Organizational Performance: Is Innovation a Missing Link?" *Journal of Marketing*, vol.62, October, pp30-45.

Hansen, M. T., Nohria, N. and Tierney, T. (1999), "What's your Strategy for Managing Knowledge?", *Harvard Business Review*, vol.77, no.2, pp106-116.

Harris, M. (1968), *The Rise of Anthropological Theory: A History of Theories of Culture*, New York: T. Y. Crowell.

Hart, S. (1987). "The Use of Mail Survey in Industrial Market Research", *Journal of Marketing Management*, vol. 3, pp25-38.

Hart, S. and Baker, M. J. (1994), "The Multiple Convergent Processing Model of New Product Development", *International Marketing Review*, vol.11, no.1, pp77-92.

Harvey, C. & Denton, J. (1999), "To Come of Age: The Antecedents of Organisational Learning", *Journal of Management Studies*, Vol.36, No.5, December, p897-918.

Hawkins, P. (1994), "Organisational Learning: Taking Stock and Facing the Challenge", *Management Learning*, vol.25, no.1, p71-82.

Hayduk, L. A. (1987), *Structural Equation Modeling with LISREL: Essentials and Advances*, Baltimore, MD: Johns Hopkins University Press.

Hayes-Roth, F., Waterman, D. A. and Lenat, D. B. (1983), "An Overview of Expert Systems", in Hayes-Roth, E., Waterman, D. A. and Lenat, D. B. (Eds), *Building Expert System*, Reading, MA: Addison-Wesley, pp3-29.

Hedberg, B. (1981), "How Organisations Learn and Unlearn", In Nystrom, P. and Starbuck, W. (Eds), *Handbook of Organisational Design*, Routledge, London, p8-27.

Hedlund, G. & Nonaka, I. (1993), "Models of Knowledge Management in the West and Japan", In Lorange, B., Chakravarthy, B., Roos, J. and Van De Ven, H. (Eds), *Implementing Strategic Process, Change, Learning, and Cooperation*, Macmillan, London, p117-144.

Hedlund, G. (1994), "A Model of Knowledge Management and the N-form Corporation", *Strategic Management Journal*, Vol.15, p73-90.

Henard, D. H. and Szymanski, D. M. (2001), "Why Some New Products are More Successful than Others", *Journal of Marketing Research*, vol. 38, no.3, pp362-375.

Hennart, J. F. (1988), "A Transaction Cost Theory of Equity Joint Ventures", *Strategic Management Journal*, vol.9, pp361-374.

Hill, F. M. (1993), *Research Methodology and the Management Disciplines: The Need for Heterogeneity*, IBAR, vol.14, no.2, pp46-56.

Hirschman, E. C. (1980), "Innovativeness, Novelty Seeking, and Consumer Creativity", *Journal of Consumer Research*, vol.7, December, pp289-295.

Hitt, M. A. and Ireland, R. D. (1985), "Corporate Distinctive Competence, Strategy, Industry and Performance", *Strategic Management Journal*, vol.6, pp273-293.

Hitt, M. A., Ireland, R. D. and Hoskisson, R. E. (1999), *Strategic Management: Competitiveness and Globalization*, Cincinnati, OH: South-Western.

Hoinville, G., Jowell, R. and Associates (1978), *Survey Research Practice*, London: Heinemann Educational Books.

Holtshouse, D. (1998), "Knowledge Research Issues", *California Management Review*, vol.40, no.3, pp277-280.

Hoyle, R. H. (1995), *Structural Equation Modeling: Concepts, Issues, and Applications*, Thousand Oaks, CA: Sage.
Hu, L.-T., & Bentler, P. (1995), "Evaluating Model Fit", In R. H. Hoyle (Ed.), *Structural Equation Modeling. Concepts, Issues, and Applications* (pp. 76-99). London: Sage.
Huber, G. P. (1991), "Organizational Learning: the Contributing Processes and the Literatures", *Organization Science*, vol.2, No.1, pp88-115.
Huber, G. P. and Daft, R. L. (1987), "The Information Environments of Organizations", in Jablin, F., Putnam, K. R., and Porter, L. (Eds), *Handbook of Organization Communications*, Beverly Hills, CA: Sage.
Hult, G. T. M. and Ketchen, D. J. Jr. (2001), "Does market orientation matter?: A test of the relationship between positional advantage and performance ", *Strategic Management Journal*; vol.22, no.9, pp899-906
Hult, G. T. M., Hurley, R. F., Giunipero, L. C. and Nichols, E. L. Jr. (2000), "Organizational Learning in Global Purchasing: A Model and Test of Internal Users and Corporate Buyers", *Decision Sciences*, vol.31, no.2, pp293-325.
Hunt, S. D. and Morgan, R. M. (1995), "The Comparative Advantage Theory of Competition", *Journal of Marketing*, vol.59, April, pp1-15.
Hurley, R. F. (1995), "Group Culture and its Effect on Innovative Productivity", *Journal of Engineering and Technology Management*, vol.12, no.1,2, pp57-75.
Hurley, R. F. and Hult, T. M. (1998), "Innovation, Market Orientation, and Organizational Learning: An Integration and Empirical Examination", *Journal of Marketing*, vol.62, July, pp42-54.
Hurt, H. T., Joseph, K. and Cook, C. D. (1977), "Scales for the Measurement of Innovativeness," *Human Communication Research*, vol.4, no.1, pp58-65.
Jacobson, R. and Aaker, D. A. (1987), "The Strategic Role of Product Quality", *Journal of Marketing*, vol.51, October, pp31-44.
Jacoby, J. (1978), "Consumer Research: A State of the Art Review", *Journal of Marketing*, vol.42, no.2, pp87-96.
James, L. R., Mulaik, S. A. and Brett, J. M. (1982), *Causal Analysis: Assumptions, Models, and Data*, Beverly Hills, CA: Sage.
Jaworski, B. J. and Kohli, A. K. (1993), "Market Orientation: Antecedents and Consequences", *Journal of Marketing*, vol.57, July, pp53-70.
Jaworski, B. J., Kohli, A. K. and Sahay, A. (2000), "Market Driven versus Driving Markets", *Journal of the Academy of Marketing Science*, vol.28, no.1, pp45-54.
Jelinek, M. (1979), *Institutionalizing Innovation: A Study of Organization Learning Systems*, New York: Praeger.
Jensen, R. (1988), "Information Capacity and Innovation Adoption", *International Journal of Industrial Organization*, vol.6, no.3, pp335-350.
Jick, T. D. (1983), "Mixing Qualitative and Quantitative Methods", in Van Maanen, J. (Ed), *Qualitative Methodology*, London: Sage.
Jobber, D. (1986), "Improving Response Rates to Industrial Mail Surveys", *Industrial Marketing Management*, vol.15, pp183-195.
Jobber, D. and O'Reilley, D. (1996), "Industrial Mail Surveys: Techniques for Inducing Response", *Marketing & Intelligence Planning*, vol.14, no.1.
Johne, A. (1999), "Successful Market Innovation", *European Journal of Innovation Management*, vol.2, no.1, pp6-11.
Johnson, J. J. and Paper, D. J. (1998), "An Exploration of Empowerment and Organizational Memory", *Journal of Managerial Issues*, vol. X, no.4, pp503-519.

Joreskog, K. G. (1993), "Testing Structural Equation Models", in Bollen, K. A. and Long, J. S. (Eds), *Testing Structural Equation Models*, pp294-316, Newbury Park, CA: Sage.

Joreskog, K. G. and Sorbom, D. (1993), *PRELIS2 Users' Reference Guide*, Chicago: Scientific Software International, Inc.

Joseph, B. and Vyas, S. J. (1984), "Concurrent Validity of a Measure of Innovative Cognitive Style", *Academy of Marketing Science*, vol.12, no.12, pp159-175.

Kalling, T. (2003), "Knowledge Management and the Occasional Links with Performance", *Journal of Knowledge Management*, vol.7, no.3, pp67-81.

Kant, I. (1965), *Critique of Pure Reason*, Trans. Norman Kemp Smith. New York: St. Martin's Press, 1965, p41.

Kanter, R. M. (1989), *When Giants Learn to Dance*, New York: Touchstone.

Kaplan, R. S. and Norton, D. P. (1996), *The Balanced Scorecard - Translating Strategy into Action*, Harvard Business School Press, Boston, Mass., 1996.

Karlsson, C. (1988), *Innovation Adoption and the Product Life-cycle*, University of Umea, Sweden.

Kerlinger, F. N. (1986), *Foundations of Behavioral Research*, 3rd Edn. Holt, Rinehart & Winston.

Kidder, L. H. and Judd, C. M. (1986), *Research Methods in Social Relations*, 5th Edn, New York: Holt, Rinehart & Winston.

Kirton, M. (1976), "Adaptors and Innovators: A Description and Measure", *Journal of Applied Psychology*, vol.61, no.5, pp622-629.

Kitchell, S. (1997), "CEO Characteristics and Technological Innovativeness: A Canadian Perspective", *Canadian Journal of Administrative Sciences*, Vol.14, No. 2, pp. 111-125.

Kleinschmidt, E. J. and Cooper, R. G. (1991), "The Impact of Product Innovativeness on Performance", *Journal of Product Innovation Management*, vol.8, pp240-251.

Kogut, B. (1988), "Joint Ventures: Theoretical and Empirical Perspectives", *Strategic Management Journal*, vol.9, pp319-332.

Kogut, B. and Zander, U. (1992), "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology", *Organisation Science*, vol.3, no.3, pp383-397.

Kohli, A. K. and Jaworski, B. J. (1990), "Market Orientation: The Construct, Research Propositions, and Managerial Implications", *Journal of Marketing*, vol.54, April, pp1-18.

Kohli, A. K., Jaworski, B. J. and Kumar, A. (1993), "MARKOR: A Measure of Market Orientation", Journal of Marketing Research, vol.xxx, November, pp467-477.

Kostova, T. (1998), "Success of the Transnational Transfer of Organizational Practices within Multinational Companies", *Working paper 98-4, Carnegie Bosch Institute*, Available at http://cbi.gsia.cmu.edu/kostova/kostova.html.

Kotler, P. (1984), *Marketing Management: Analysis, Planning, and Control*, Englewood Cliffs, NJ: Prentice-Hall, Inc.

Kotler, P. and Andreasen, A. R. (1987), *Strategic Marketing for Nonprofit Organizations*: Englewood Cliffs, NJ: Prentice-Hall, Inc.

Kuhn, T. S. (1970), *The Structure of Scientific Revolution*, Chicago: University of Chicago Press.

Lam, A. (2000), "Tacit Knowledge, Organisational Learning and Societal Institutions: An Integrated Framework", *Organisation Studies*, vol.21, no.3, pp487-513.

Lancy, D. F. (1993), *Qualitative Research in Education*: An Introduction to the Major Traditions, New York: Longman.

Lave, J. and Wenger, E. (1991), *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press.

Learned, E. P., Christensen, C. R., Andrews, K. and Guth, W. D. *(1965), Business Policy*, Homewood, IL: Irwin.

Leavy, B. (1999), "Organization and Competitiveness – Towards a New Perspective", *Journal of General Management*, vol.24, no.3, pp33-52.

Lei, D., Slocum, J. W. Jr. and Pitts, R. A., (1997), 'Building cooperative advantage: Managing Strategic Alliances to Promote Organizational Learning', *Journal of World Business*, vol. 32, no. 3, pp203-23.

Leung, L. (1998), "Lifestyles and the Use of New Media Technology in Urban China", *Telecommunications Policy*, vol.22, no.9, pp781-790.

Levitt, B. and March, J. G. (1988), "Organizational Learning", *Annual Review of Sociology*, vol.14, no. 3, pp319-340.

Levitt, T. (1960), "Marketing Myopia", *Harvard Business Review*, vol.38, no.4, 45-56.

Li, T. and Calantone, R. J. (1998), "The Impact of Market Knowledge Competence on New Product Advantage: Conceptualization and Empirical Examination", *Journal of Marketing*, vol.62, October, pp13-29.

Liebowitz, J. and Beckman, T. (1998*), Knowledge Organizations: What Every Manager Should Know*, CRC Press, Boca Raton, FL.

Lincoln, Y. S. and Guba, E. G. (1985), *Naturalistic Inquiry*, Newbury Park Calif.; London: Sage.

Little R. J. A. and Rubin D. B., (1987), *Statistical Analysis with Missing Data*, John Wiley, New York.

Lorente, A. R. M., Dewhurst, F. and Dale, B. G. (1999), "TQM and Business Innovation", *European Journal of Innovation Management*, vol.2, no.1, pp12-19.

Lovelace, K., Shapiro, D. L. and Weingart, L R. (2001), "Maximizing Cross-functional New Product Teams' Innovativeness and Constraint Adherence: A Conflict Communications Perspective", *Academy of Management Journal*, vol.44, no.4, pp779-793.

Lukas, B., Hult, G. T. and Ferrell, O. C. (1996), "A Theoretical Perspective of the Antecedents and Consequences of Organisational Learning in Marketing Channels", *Journal of Business Research*, vol.36, pp233-244.

Lumpkin, G. T. and Dess, G. G. (1996), "Clarifying the Entrepreneurial Orientation Construct and Linking it to Performance", *Academy of Management Review*, vol.97, January, pp135-172.

Lyles, M. (1992), "The Impact of Organisational Learning on Joint Venture Formations", Presented at the *Academy of Management Meetings*, Las Vegas, NV.

Lyon, D., Lumpkin, G., and Dess, G. (2000), "Enhancing Entrepreneurial Orientation Research: Operationalizing and Measuring a Key Strategic Decision Making Process", *Journal of Management*, Vol. 26, no. 5, pp1055-1085.

Lytras, M. D., Pouloudi, A. and Poulymenakou, A. (2002), "Knowledge Management Convergence – Expanding Learning Frontiers", *Journal of Knowledge Management*, vol.6, no.1, pp40-51.

MacKay, D. M. (1969), *Information, Mechanism and Meaning*, Cambridge, Massachusetts: MIT Press.

Madsen, T. K. (1989), "Successful Exporting Management: Some Empirical Evidence", *International Marketing Review*, vol.6, no.4, pp41-57.

Mahoney, J. T. and Pandian, J. R. (1992), "The Resource-based View within the Conversation of Strategic Management", *Strategic Management Journal*, vol. 13, pp363-380.

Mansfield, E. (1968), *Industrial Research and Technological Innovation*, W.W. Norton & Company Inc., New York.

March, J. G. and Olsen, J. P. (1976), "Organizational Learning and the Ambiguity of the Past", in March, J. G. and Olsen, J. P. (Eds), *Ambiguity and Choice in Organizations*, Bergen, Norway: Unversitetsforlaget, pp54-68.

Marchand, D. A., Kettinger, W. J. and Rollins, J. D. (2000), "Information Orientation: People, Technology and the Bottom Line", *Sloan Management Review*, vol.41, no.4, pp69-72.

Maria, J. and Marti, V. (2001), "ICBS-Intellectual Capital Benchmarking System", *Journal of Intellectual Capital*, vol.2, no.2, pp148-164.

Markides, C. (1998), "Strategic Innovation in Established Companies", *Sloan Management Review*, Spring, pp31-42.

Marshall, C. and Rossman, G. B. (1989), *Designing Qualitative Research*, Newbury Park, Calif.; London: Sage.

Marti, J. M. V. (2001), "ICBS-Intellectual Capital Benchmarking System", *Journal of Intellectual Capital*, vol. 2, no.2, pp148-165.

Maruyama, G. M. (1998), *Basics of Structural Equation Modeling*, Thousand Oaks, CA: Sage.

Masaaki, K. and Scott, S. K. (1995), "The Role of Strategic Alliances in High-technology New Product Development", *Strategic Management Journal*, vol.16, no.8, pp621-636.

Matlay, H. (1997), *Learning Organisations in Context: A Literature Review*, EDEXEL, London.

Matsuno, K. and Mentzer, J. T. (2000), "The Effects of Strategy Type on the Market Orientation- Performance Relationship", *Journal of Marketing*, vol.64, October, pp1-16.

Mayo, E. (1933), *The Human Problems of Industrial Civilization*, Macmillan: New York, USA.

McAdam, R. & McCreedy, S. (1999), "A Critical Review of Knowledge Management Models", *The Learning Organisation*, Vol.6, No.3, p91-100.

McCracken, M. and Wallace, M. (2000), "Towards a Redefinition of Strategic HRD", *Journal of European Industrial Training*, vol.24, no.5, pp281-290.

McDermott, D. R., Franzak, F. J. and Little, M. W. (1993), "Does Marketing Relate to Hospital Profitability?" *Journal of Health Care Marketing*, vol.13, no.2, pp8-25.

McDermott, R. (1999), "Why Information Technology Inspired But Cannot Deliver Knowledge Management", *California Management Review*, vol.41, no.4, pp103-117.

McDermott, R. and O'Dell, C. (2001), "Overcoming Cultural Barriers to Sharing Knowledge", *Journal of Knowledge Management*, vol.5, no.1, pp76-85.

McDonald, D. W., and Ackerman, M. S. (1998), "Just Talk to Me: A Field Study of Expertise Location" *Proceedings of the ACM Conference on Computer-Supported Cooperative Work (CSCW '98)*, 1998: 315-324.

McGill, M. E., Slocum, J. W. and Lei, D. (1993), "Management Practices in Learning Organizations", *Organizational Dynamics*, vol.22, pp5-17.

McNamara, C. P. (1972), "The Present Status of the Marketing Concept", *Journal of Marketing*, vol.36, January, pp50-57.
Mehrens, W. A. and Lehmann, Il J. (1984), *Measurement and Evaluation in Education and Psychology*, 3rd Edn. Holt-Saunders.
Menon, A. and Varadarajan, P. R. (1992), "A Model of Marketing Knowledge Use Within Firms", *Journal of Marketing*, vol.56, October, pp53-71.
Merton, R. (1957), "Bureaucratic Structure and Personality", in *Social Theory and Social Structure*, New York: Free Press.
Meyer, M. H. and Utterback, J. M. (1995), Product Development Cycle Time and Commercial Success, *IEEE Transactions in Engineering Management*, vol.42, no.4, pp297-304.
Micceri, T. (1989), "The Unicorn, the Nomal Curve, and Other Improbable Creatures", *Psychological Bulletin*, vol.105, pp156-166.
Midgley, D. F. and Dowling, G. R. (1978), "Innovativeness: the Concept and its Measurement", *Journal of Consumer Research*, vol.4, no.3, pp229-242.
Miles, M. B. and Huberman, A. M. (1984), *Qualitative Data Analysis*, London: Sage.
Miles, R. E. and Snow, C. C. (1978), *Organizational Strategy, Structure and Process*, New York: McGraw-Hill.
Miller, D. (1983), "The Correlates of Entrepreneurship in Three Types of Firms", *Management Science*, vol.29, pp770-791.
Miller, D. (1987), "Strategy Making and Structure: Analysis and Implications for Performance", *Academy of Management Journal*, vol.30, pp7-32.
Miller, D. (1988), "Relating Porter's Business Strategies to Environment and Structure: Analysis and Performance Implications", *Academy of Management Journal*, vol.31, no.2, pp280-308.
Miller, D. (1991), "Stale in the Saddle: CEO Tenure and the Match Between Organization and Environment", *Management Science*, vol.37, no.1, pp34-52.
Miller, D. (1996), "A Preliminary Typology of Organisational Learning: Synthesizing the Literature", *Journal of Management*, vol.22, no.3, pp485-505.
Miller, D. and Friesen, P. H. (1983), "Strategy-making and Environment: the Third Link", *Strategic Management Journal*, vol.4, no.3, pp221-235.
Moore, D. S. (1991), *Statistics: Concepts and Controversies*, 3rd Edn, W. H. Freeman.
Moorman, C. and Miner, A. S. (1997), "The Impact of Organizational Memory on New Product Performance and Creativity", *Journal of Marketing Research*, vol.XXXIV, February, pp91-106.
Moorman, C. and Miner, A. S. (1998a), "Organizational Improvisation and Organizational Memory", *Academy of Management*, vol.23, no.4, pp698-723.
Moorman, C. and Miner, A. S. (1998b), "The Convergence of Planning and Execution: Improvisation in New Product Development", *Journal of Marketing*, vol.62, no.3, pp1-20.
Mulaik, S. A., James, L. R., Alstine, J. V., Bennett, N., Lind, S. and Stilwell, C. D. (1989), "Evaluation of Goodness-of-fit Indices for Structural Equation Models", *Psychological Bulletin*, vol.105, pp430-445.
Mullin, R. (1996), "Knowledge Management: A Cultural Evolution", *Journal of Business Strategy*, Sept/Oct, pp56-61.
Nachmias, C. and Nachmias, D. (1981), *Research Methods in the Social Sciences*, Edward Arnold, London.

Nahapiet, J. and Ghoshal, S. (1998), "Social Capital, Intellectual Capital, and the Organizational Advantage", *Academy of Management Review*, vol.23, no.2, pp242-267.

Narver, J. C. and Slater, S. F. (1990), "The Effect of a Market Orientation on Business Profitability", *Journal of Marketing*, vol.54, October, pp20-35.

Narver, J. C., Jacobson, R. L. and Slater, S. F. (1999), "Market Orientation and Business Performance: An Analysis of Panel Data", in Deshpande, R. (Ed) *Developing a Market Orientation*, Thousand Oaks, CA: Sage Publications, pp195-216.

Nelson, R. R. and Winter, S. G. (1982), *An Evolutionary Theory of Economic Change*, Cambridge, MA: Harvard University Press.

Nemeth, C. J. (1997), "Managing Innovation: when Less is More", *California Management Review*, vol. 40, no.1, pp59-74.

Nonaka, I. (1994), "A Dynamic Theory of Organisational Knowledge Creation", *Organisational Science*, Vol.5, No.1, February, p14-37.

Nonaka, I. and Takeuchi, H. (1995), *Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, Oxford.

North, D. and Smallbone, D. (2000), "The Innovativeness and Growth of Rural SMEs during the 1990s", *Regional Studies*, vol.34, no.2, pp145-157.

Nunally, J. C. (1978), *Psychometric Theory*, 2nd Edition, McGraw-Hill Inc., New York.

Nystrom, C. B. and Starbuck, W. (1984), "To Avoid Organizational Crises, Unlearn", *Organizational Dynamics*, vol.13, pp53-65.

O'Dell, C., Wiig, K. and Odem, P. (1999), "Benchmarking Unveils Emerging Knowledge Management Strategies", *Benchmarking: An International Journal*, vol.6, no.3, pp202-211.

Oczkowski, E. and Farrell, M. A. (1998), "Discriminating between Measurement Scales Using Nontested Tests and Two Stage Least Squares Estimators: The Case of Market Orientation", *International Journal of Research in Marketing*, vol.15, pp349-366.

Olivera, F. (2000), "Memory Systems in Organizations: An Empirical Investigation of Mechanisms for Knowledge Collection, Storage, and Access", *Journal of Management Studies*, vol.37, no.6, pp811-832.

Olsen, E. M., Walker, O. C. Jr., Ruekert, R. W. (1995), "Organizing for effective new product development: The moderating role of product innovativeness", *Journal of Marketing*, vol.59, no.1, pp48-

Oppenheim, A. N. (1992), *Questionnaire Design, Interviewing and Attitude Measurement*, London: Pinter Publishers.

Oppenheim, A. N. (2000), *Questionnaire Design, Interviewing and Attitude Measurement*, New Edition, Continuum, London.

Pallister, J. G. and Foxall, G. R. (1998), "Psychometric Properties of the Hurt-Joseph-Cook Scales for the Measurement of Innovativeness", *Technovation*, vol.18, no.11, pp663-675.

Parasuraman, A. (1986), *Marketing Research*, Addison-Wesley Publishing Company, Reading.

Parikh, M. (2001), "Knowledge Management Framework for High-tech Research and Development", *Engineering Management Journal*, vol.13, no.3, September, pp27-33.

Park, C. W. and Zaltman, G. (1987), *Marketing Management*, Chicago: Dryden Press.

Patchen, M., Pelz, D. and Allen, C. (1965), *Some Questionnaire Measures of Employee Motivation and Morale*, Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan.
Patton, M. Q. (1980), *Qualitative Evaluation Methods*, Chicago, IL: 60-62.
Pedler, M., Burgoyne, J. & Boydell, T. (1991), *The Learning Company*, McGraw-Hill, London.
Pelham, A. M. (2000), "Market Orientation and Other Potential Influences on Performance in Small and Medium-Sized Manufacturing Firms", *Journal of Small Business Management*, vol.38, no.1, pp48-67.
Pelham, A. M. and Wilson, D. T. (1996), "A Longitudinal Study of the Impact of Market Structure, Firm Structure, Strategy, and Market Orientation Culture on Dimensions of Small-Firm Performance", *Journal of the Academy of Marketing Science*, vol.24, no.1, pp27-43.
Pemberton, J. D. & Stonehouse, G. H. (2000), "Organisational Learning and Knowledge Assets - An Essential Partnership", *The Learning Organisation*, Vol.7, No.4, p184-193
Penrose, E. T. (1959), *The Theory of the Growth of the Firm*, John Wiley, New York.
Perez-Bustamante, G. (1999), "Knowledge Management in Agile Innovative Organisations", *Journal of Knowledge Management*, vol.3, no.1, pp6-17.
Peter, J. P. (1979), "Reliability: A Review of Psychometric Basics and Recent Marketing Practices", *Journal of Marketing Research*, vol.16, February, pp6-17.
Peter, J. P. (1981), "Construct Validity: A Review of Basic and Marketing Practices", *Journal of Marketing Research*, vol.18, May, pp133-145.
Peter, J. P. and Churchill, G. A., Jr. (1986), "Relationships among Research Design Choices and Psychometric Properties of Rating Scales: A Meta-Analysis", *Journal of Marketing Research*, vol.23, February, pp1-10.
Peters, T. and Waterman, R. (1982), *In Search of Excellence*, New York, London: Harper & Row.
Peters, T. J. and Austin, N. (1985), *A Passion for Excellence*, New York: Random House, Inc.
Peterson, R. A. (1982), *Marketing Research*, Business Publication Inc. Plane, Texas.
Pfeffer, J. (1983), "Organizational Demography", in Cummings, L. L. and Staw, B. M. (Eds), *Research in Organizational Behavior*, vol.5, Greenwich, CT: JAI Press.
Phillips, L., Chang, D. and Buzzell, R. (1983), "Product Quality, Cost Position, and Business Performance: A Test of Some Key Hypotheses", *Journal of Marketing*, vol.47, no.2, pp26-43.
Pinsonneault, A. and Kraemer, K.L. (1993), "The Survey Research Strategy in Studies of Information Systems: Review and Critique," *Journal of Management Information Systems*, vol.10, no.2, pp75-106.
Platts, M. J. and Yeung, M. B. (2000), "Managing Learning and Tacit Knowledge", *Strategic Change*, vol.9, pp347-355.
Polanyi, M. (1958), *Personal Knowledge*, Chicago: University of Chicago Press.
Polanyi, M. (1962), *Personal Knowledge: Towards a Post Critical Philosophy*, Harper, Torchbooks, New York, NY.
Popper, M. & Lipshitz, R. (2000a), "Organisational Learning - Mechanisms, Culture and Feasibility", *Management Learning*, Vol.31 (2), p181-196, Sage Publications.
Popper, M. and Lipshitz, R. (1998), "Organizational Learning Mechanisms: A Structural and Cultural Approach to Organizational Learning", *Journal of Applied Behavioral Science*, vol. 34, no.2, pp161-179.

Porter, M. E. (1980), *Competitive Advantage*, New York: Free Press.

Porter, M. E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, N. Y.: Free Press.

Price, J. L. and Mueller, C. W. (1986), *Handbook of Organizational Measurement*, Marshfield, MA: Pitman.

Prusak, L. (1996), "The Knowledge Advantage", *Strategy and Leadership*, March-April.

Quinn, J. B. (1992), *Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry*, New York: The Free Press.

Quinn, J. B. (2000), "Outsourcing Innovation: The New Engine of Growth", *Sloan Management Review*, vol.41, no.4, pp13-28.

Quinn, J. B.; Anderson, P. and Finkelstein, S. (1996), "Managing Professional Intellect: Making the Most of the Best", *Harvard Business Review*, vol.74, March, pp71-82

Quinn, R. E. (1988), *Beyond Rational Management*, San Francisco: Jossey-Bass Inc., Publishers.

Quintas, P., Lefrere, P. & Jones, G. (1997), "Knowledge Management: A Strategic Agenda", *Journal of Long Range Planning*, Vol.30, No.3, p385-391.

Rainey, H. G. (1999), "Using Comparison of Public and Private Organizations to Assess Innovative Attitudes among Members of Organizations", *Public Productivity & Management Review*, vol.23, no.2, pp130-149.

Raykov, T. and Widaman, K. F. (1995), "Issues in Structural Equation Modeling Research", *Structural Equation Modeling: A Multidisciplinary Journal*, vol.2, pp289-318.

Reich, R. (1992), *The Work of Nations*, New York: Vintage Press.

Roberts, J. (2000), "From Know-how to Show-how? Questioning the Role of Information and Communication Technologies in Knowledge Transfer", *Technology Analysis & Strategic Management*, vol.12, no.4, pp429-443.

Rogers, C. (1959), "Towards a Theory of Creativity", in Anderson, H. *Creativity and its Cultivation*, New York: Harper.

Rogers, E. M. (1983), *Diffusion of Innovation*, 3rd Ed, The Free Press, New York, NY.

Rogers, E.M. and Shoemaker, F.F. (1971), *Communication of innovations: A cross-cultural approach.* (2nd Edition.), New York: Free Press.

Rose, D. and Sullivan, O. (1993), *Introducing Data Analysis for Social Scientists*, Buckingham: Open University Press.

Rossman, G.B. and Wilson, B.C. (1985) "Numbers and Words: Combining Qualitative and Quantitative Methods in a Single Large-scale Evaluation Study". *Evaluation Review*, vol. 9, no.5, pp627-643.

Rothwell, R. and Zegveld, W. (1982), *Innovation and the Small and Medium Sized Firm*, Frances Pinter, London.

Ruekert, R.W. (1992). "Developing a Market Orientation: An Organizational Strategy Perspective", *International Journal of Research in Marketing*, vol. 9, pp. 225-245.

Russell, B. (1961), *A History of Western Philosophy*, London: Unwin Hyman.

Rust, R. T., Zahorik, A. J. and Keiningham, T. L. (1995), "Return on Quality: Making Service Quality Financially Accountable", *Journal of Marketing*, vol.59, April, pp58-70.

Sackett, P. R., & Larson, J. R., Jr. (1990). "Research Strategies and Tactics in Industrial and Organizational Psychology", In M. D. Dunette & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology*, vol. 1 (2nd ed.) (pp 419-489), Palo Alto, CA: Consulting Psychologists Press.

Sackmann, S. A. (1991), *Cultural Knowledge in Organizations*. Newbury Park, CA: Sage Publications, Inc.
Scandura, T. A. & Williams, E. A. (2000). "Research Methodology in Management: Current Practices, Trends, and Implications for Future Research", *Academy of Management Journal*, vol. 43, pp1248-1264.
Schank, R. C. (1990), *Tell Me A Story: A New Look at Real and Artificial Memory*, New York: Charles Scirbner & Sons.
Schendel, D. (1990), "Introduction to the Special Issue on Corporate Entrepreneurship", *Strategic Management Journal*, vol.11, Summer, pp1-3.
Schertzer, C. B. and Kernan, J. B. (1985), "More on the Robustness of Response Scales", *Journal of Marketing Research Society*, vol.8, no.4, pp261-282.
Schmidt, J. B. and Calantone, R. J. (1998), "Are Really New Product Development Projects Harder to Shut Down", *The Journal of Product Innovation Management*, vol.15, no.2, pp111-123.
Schulz, M. (2001), "The Uncertain Relevance of Newness: Organizational Learning and Knowledge Flows", *Academy of Management Journal*, vol.44, no. 4, pp661-681.
Schumacker, R. E. and Lomax, R. G. (1996), *A Beginner's Guide to Structural Equation Modeling*, Lawrence Erlbaum Associates, Publishers, Mahwah, New Jersey.
Schumpeter, J. A. (1934), *The Theory of Economic Development*, Cambridge, Massachusetts: Harvard University Press.
Sekaran, U. (1992), *Research Methods for Managers: A Skill-Building Approach*, Second Edition, New York: John Wiley and Sons.
Senge, P. (1990), *The Fifth Discipline: The Art and Practice of the Learning Organisation*, Doubleday, New York, NY.
Sethi, R., Smith, D. C. and Park, C. W. (2001), "Cross-functional Product Development Teams, Creativity, and the Innovativeness of New Consumer Products", *Journal of Marketing Research*, vol.38, no. 1, pp73-85.
Shapiro, B. P. (1988), "What the Hell is Market Oriented?" *Harvard Business Review*, vol.66, November/December, pp119-125.
Shaw, R. B. and Perkins, D. N. T. (1992), "Teaching Organizations to Learn: The Power of Productive Failures", in Nadler, D. A., Gerstein, M. S. and Shaw, R. B. (Eds), *Organizational Architecture*, San Francisco: Jossey-Bass, pp175-191.
Siegler, R. S. (1983), "Five Generalizations about Cognitive Development", *American Psychologist*, vol.38, March, pp263-277.
Silberston, A. (1967), *The Patent System*, Lloyds Bank Review, vol. 84, April, pp32-44.
Simon, A. (1994), A Generative Strategy for Investigating Management Practices in the Australian Business Service Industry and for QM Customer Surveys, *Proceedings of the First National Research Conference on Quality Management*, Mount Eliza, Victoria, pp65-77.
Simonin, B. L. (1999), "Ambiguity and the Process of Knowledge Transfer in Strategic Alliances", *Strategic Management Journal*, vol.20, pp595-623.
Sinkula, J. M. (1994), "Market Information Processing and Organizational Learning", *Journal of Marketing*, vol.58, January, pp35-45.
Sinkula, J. M., Baker, W. E. and Noordewier, T. (1997), "A Framework for Market-Based Organizational Learning: Linking Values, Knowledge, and Behavior", *Journal of the Academy of Marketing Science*, vol.25, no.4, pp305-318.
Skandia, (1994), *Visualizing Intellectual Capital in Skandia*, intellectual capital supplement, www.skandia.se.

Slater, S. F. and Narver, J. C. (1995), "Market Orientation and the Learning Organization", *Journal of Marketing*, vol.59, July, pp63-74.
Slater, S. F. and Narver, J. C. (1998), "Customer-led and Market-oriented: Let's Not Confuse the Two", *Strategic Management Journal*, vol.19, no.10, pp1001-1006.
Slater, S. F. and Narver, J. C. (1999), "Market-oriented is More Than Being Customer-led", *Strategic Management Journal*, vol.20, no.12, pp1165-1168.
Smith, K. A., Vasudevan, S. P. and Tanniru, M. R. (1996), "Organisational Learning and Resource-based Theory: An Integrative Model", *Journal of Organizational Change Management*, vol.9, no.6, pp41-53.
Smith, R. B. (1983), *An Introduction to Social Research*, Cambridge, Mass.: Ballinger.
Snow, C. C. and Hrebiniak, L. G. (1980), "Strategy, Distinctive Competence, and Organizational Performance", *Administrative Science Quarterly*, vol.25, pp317-336.
Song, M. and Parry, M. E. (1997b), "Cross-national Comparative Study of New Product Development Processes: Japan and the United States", Journal of Marketing, vol.61, April, pp1-18.
Song, M. and Parry, M. E. (1999), "Challenges of Managing the Development of Breakthrough Products in Japan", *Journal of Operations Management*, vol.17, no.6, pp665-688.
Spender, J. C. (1994), "Organizational Knowledge, Collective Practice and Penrose Rents", *International Business Review*, vol.3, no.4, pp353-367.
Spender, J. C. (1996), "Competitive Advantage from Tacit Knowledge? Unpacking the Concept and its Strategic Implications", in Moingeon, B. and Edmondson, A. (Eds), *Organizational Learning and Competitive Advantage*, Sage, London, pp56-73.
Srinivasan, P. (1998), "Integrated Digital Libraries: Changing the Essence of Research, Analysis and Knowledge Management", *Journal of Knowledge Management*, vol.2, no.2, December, pp47-52.
Stainback, S. and Stainback, W. (1988), *Understanding and Conducting Qualitative Research*, Dubuque, IA: Kendall / Hunt.
Stalk, G., Evans, P. and Shulman, L. (1992), "Competing on Capabilities: The New Rules of Corporate Strategy", *Harvard Business Review*, vol.70, March/June, pp57-69.
Stanworth, J. and Gray, C. (1991) Bolton 20 Years On - The Small Firm in the 1990s. Athenaeum Press
Stewart, K. A., Baskerville, R., Storey, V. C., Senn, J. A., Raven, A. and Long, C. (2000), "Confronting the Assumptions Underlying the Management of Knowledge: An Agenda for Understanding and Investigating Knowledge Management", *The DATABASE for Advances in Information Systems*, vol.31, no.4, pp41-53.
Stewart, T. A. (1997), "Why Dumb Thinks Happen to Smart Companies: Symptoms of Bad Brainpower Management", *Fortune*, June, pp159-160.
Storey, D. J. (1994) Understanding the Small Business Sector. Routledge
Subramanian, A. and Nilakanta, S. (1996), "Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance", Omega, vol.24, no.6, pp631-647.
Swan, J., Scarbrough, H. and Preston, J. (1999b), "Knowledge Management: The Next Fad to Forget People?", *Proceedings of ECIS'99*, Copenhagen: Copenhagen Business School, pp668-678.

Szulanski, G. (1996), "Exploring Internal Stickiness: Impediments to the Transfer of Best Practices within the Firm", *Strategic Management Journal*, vol.17, Winter Special Issue, pp27-43.

Taylor, F. W. (1911a), *Shop Management*, Harper (1947 Edition): New York, USA.

Taylor, F. W. (1911b), *The Principles of Scientific Management*, Harper (1947 Edition): New York, USA.

Taylor, S. and Todd, R. A. (1995), "Understanding IT Usage: A Test of Competing Models", *Information Systems Research*, vol.6, no.2, pp144-176.

Teece, D. J. (1998), "Capturing Value for Knowledge Assets: The New Economy, Markets for Know-how and Intangible Assets", *California Management Review*, vol.40, no.3, pp55-79.

Terrett, A (1998), "Knowledge Management and the Law Firm", *Journal of Knowledge Management*, vol. 2, no.1, pp. 67-76.

Thompson, V. A. (1965), "Bureaucracy and Innovation", *Administrative Science Quarterly*, vol.5, June, pp1-20.

Tobin, D. R. (1993), *Re-educating the Corporation: Foundations for the Learning Organization*, Essex Junction

Toffler, A. (1990), *Powershift: Knowledge, Wealth and Violence at the Edge of the 21st Century*, New York: Bantam Books.

Tomer, J. F. (1987), *Organizational Capital: The Path to Higher Productivity and Well-being*, New York: Praeger.

Trochim, W. M. (2000), *The Research Methods Knowledge Base*, 2nd Edition, Cincinnati, OH: Atomic Dog Publishing.

Tull, D. S. and Hawkins, D. I. (1990), *Marketing Research: Measurement and Method*, Fifth Edition, New York: Macmillan Publishing Company.

Tuomi, I. (1996) "The Communicative View on Organizational Memory: Power and Ambiguity in Knowledge Creation Systems", In J.F. Nunamaker, Jr. and R.H. Sprague, Jr. (eds), *Proceedings of the Twenty-Ninth Hawaii International Conference on System Sciences, Vol III.* IEEE Computer Society Press, Los Alamitos, CA, pp. 147-55.

Tushman, M. L. and Anderson, P. A. (1986), "Technological Discontinuities and Organisational Environments", *Administrative Science Quarterly*, vol.31, no.3, pp439-466.

Uit Beijerse, R. P. (1999), "Questions in Knowledge Management: Defining and Conceptualising a Phenomenon", *Journal of Knowledge Management*, 3(2), pp12-23.

Urban, G. L., Hauser, J. R. and Dholakia, N. (1987), *Essentials of New Product Management*, Englewood Cliffs, NJ: Prentice-Hall, Inc.

Utterback, J. M. (1994), *Mastering the Dynamics of Innovation*, Harvard Business School Press, Boston, MA.

Van der Bent, J., Paauwe, J. and Williams, R. (1999), "Organizational Learning: An Exploration of Organizational Memory and Its Role in Organizational Change Processes", *Journal of Organizational Change Management*, vol.12, no.5, pp377-404.

Van Maanen, J. (1983), *Qualitative Methodology*, Sage, London

Villadsen, B. (1995), "Communication on Delegation in Collusive Agencies", *Journal of Accounting and Economics*, March-May, pp315-344.

Vollmer, M. and Phillips, T. (2000), "Growing Intellectual Capital: How it Related to the Bottom Line", *Offshore*, 74 and 100.

Walsh, A. (1990), *Statistics for the Social Sciences – With Computer Applications*, New York: Harper & Row.

Walsh, J. P. (1995), "Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane", *Organization Science*, vol.6, pp280-321.
Walsh, J. P. and Ungson, G. R. (1991), "Organizational Memory", *Academy of Management Review*, vol.16, no.1, pp57-91.
Wang, C. L. and Ahmed, P. K. (2003), "Organisational Learning: A Critical Review", *The Learning Organisation Journal*, vol. 10, no.1, pp8-17.
Wang, S. (1999), "Organizational Memory Information Systems: A Domain Analysis in the Object-Oriented Paradigm", *Information Resources Management Journal*, vol. 12, no.2, pp26-35.
Webb, J. R. (1992), *Understanding and Designing Marketing Research*, London: The Dryden Press.
Weber, M. (1948), *From Max Weber: Essays in Sociology* (Translated, edited and with an introduction by Gerth, H.H. and Mills, C. W.). Routledge and Kegan Paul: London.
Weber, M. (1948), *The Theory of Social and Economic Organization*, New York: Oxford Press.
Webster, F. E. (1992), "The Changing Role of Marketing in the Corporation", *Journal of Marketing*, vol.56, pp1-17.
Webster, F. E. Jr. (1988), "Rediscovering the Marketing Concept", *Business Horizons*, vol.31, May-June, pp29-39.
Weick, K. E. (1979), *The Social Psychology of Organizing*, 2nd Ed, Reading, MA: Addison-Wesley.
Weiers, R. M. (1984), *Marketing Research*, Englewood Cliffs: Prentice-Hall.
Weisbord, M. E. (1987), *Productive Workplaces*, San Francisco, CA: Jossey-Bass.
Wernerfelt, B. (1984), "A Resource-based View of the Firm", *Strategic Management Journal*, vol.5, no.2, pp795-815.
West, S. G., Finch, J. F. and Curran, P. J. (1995), "Structural Equation Models with Nonnormal Variables: Problems and Remedies", in Hoyle, R. H. (Eds), *Structural Equation Modeling: Concepts, Issues, and Applications*, pp56-75, Sage Publications, London.
Wexler, M. M. (2002), "Organizational Memory and Intellectual Capital", *Journal of Intellectual Capital*, vol.3, no.4, pp393-414.
Wheaton, B., Muthén, B., Alwin, D., & Summers, G. (1977). "Assessing reliability and stability in panel models". In D.R. Heise (Eds.): *Sociological Methodology*. San Fransisco: Jossey-Bass.
Wiggins, R. R. (1997), "Sustaining Competitive Advantage: Temporal Dynamics and the Rarity of Persistent Superior Economic Performance", *Paper presented at the Academy of Management 1997 Annual Meeting BPS Division*, August.
Wijnhoven, F. (1998), "Designing Organizational Memories: Concept and Method", *Journal of Organizational Computing and Electronic Commerce*, vol.8, no.1, pp29-55.
Wilcox, J. B. (1994), "Assessing Sample Representativeness in Industrial Surveys", *Journal of Business & Industrial Marketing*, vol.9, no.2, pp51-61.
Williamson, O. E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organisation*, New York: Free Press; London: Collier Macmillan.
Winter, S. G. (1987), "Knowledge and Competence as Strategic Assets", in Teece, D. J. (Eds)., *The Competitive Challenge: Strategies for Industrial Innovation and Renewal*, pp159-184, Cambridge, Massachusetts: Ballinger.

Wright, L. T. and Crimp, M. (2000), *The Marketing Research Process*, 5th Edition, Prentice Hall.

Yin, R. K. (1989), *Case Study Research: Design and Methods*, Sage, London.

Yu, J. and Cooper, H. (1983), "A Quantitative Review of Research Design Effects on Response Rates to Questionnaires", *Journal of Marketing Research*, vol.20, no.1, pp36-44.

Zack, M. H. (1999b), "Managing Codified Knowledge", *Sloan Management Review*, Summer, pp45-58.

Zaichkowsky, J. L. (1987), *The Personal Involvement Inventory: Reduction, Revision, and Application to Advertising*, Working Paper, Simon Fraser University.

Zaltman, G., Duncan, R., & Holbek, J. (1973), *Innovations and Organisations*, New York: John Wiley & Sons.

Zirger, B. J. (1997), "The Influence of Development Experience and Product Innovativeness on Product Outcome", *Technology Analysis & Strategic Management*, vol.9, no.3, pp287-297.

Appendices:

Appendix 1. Cover letter for mail questionnaire

UNIVERSITY OF WOLVERHAMPTON

Wolverhampton Business School
Shropshire Campus
Shifnal Road
Priorslee
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Date as postmark

Dear Sir/Madam,

Knowledge Management & Performance Survey by the University of Wolverhampton Business School

As you are well aware, managing knowledge and information has become imperative for companies to succeed in the increasingly competitive marketplace. During the past three years, we have been developing frameworks of best practice for knowledge and information management, which can be used to improve company performance. This 'Knowledge Management & Performance Survey' designed by the Centre for Enterprise Excellence at the Wolverhampton Business School is the final stage of this project.

We have carefully selected companies in the UK and welcome your insights on managing knowledge and information within your company. We would be very grateful if you could complete the enclosed questionnaire, or identify a suitable person in your company to fill it in. Any information received will be kept in the strictest confidence and no company or personnel will be identified in the final report, which is scheduled for publication in July 2003. If you would like to receive a summary report, please indicate this on the front page of the enclosed questionnaire.

We appreciate your time and insights on this project and look forward to receiving your completed questionnaire shortly.

Kind regards

Catherine Wang
Researcher
The Centre for Enterprise Excellence
Wolverhampton Business School

Professor Pervaiz Ahmed
Chair in Management
Head, Centre for Enterprise Excellence
Wolverhampton Business School

PAGE

NUMBERING

AS ORIGINAL

I. Business Practices

	Market Orientation	Strongly disagree			Not sure			Strongly agree
1	In our company, we meet with customers very often (i.e. at least once a year) to find out what products or services they will need in the future.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	In our company, we do a lot of in-house market research.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	We are slow to detect changes in our customers' product preferences.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
4	We poll end users very often (i.e. at least once a year) to assess the quality of our products and services.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	We are slow to detect fundamental shifts in our industry (e.g. competition, technology, regulation).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	We periodically review the likely effect of changes in our business environment (e.g. regulation) on customers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	We have interdepartmental meetings very often (i.e. at least once a quarter) to discuss market trends and developments.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
8	Marketing personnel in our company spend time discussing customers' future needs with other functional departments.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
9	When something important happens to a major customer or market, the whole company knows about it within a short period.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	Data on customer satisfaction are disseminated at all levels in our company on a regular basis.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
11	When one department finds out something important about competitors, it is slow to alert other departments.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	It takes us a very long time to decide how to respond to our competitors' price changes.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
13	For one reason or another we tend to ignore changes in our customers' product or service needs.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
14	We periodically review our product development efforts to ensure that they are in line with what customers want.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	Several departments get together periodically to plan a response to changes taking place in our business development.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
16	If a major competitor were to launch an intensive campaign targeted at our customers, we would implement a response immediately.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
17	The activities of the different departments in our company are well coordinated.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
18	Customer complaints fall on deaf ears in this company.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
19	Even if we came up with a great marketing plan, we probably would not be able to implement it in a timely fashion.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
20	When we find that customers would like us to modify a product or service, the departments involved make concerted efforts to do so.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Organisational Learning		Strongly disagree			Not sure			Strongly agree
21	Managers basically agree that our organisation's ability to learn is the key to our competitive advantage.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
22	The basic values of this organisation include learning as a key to improvement.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	The sense around here is that employee learning is an investment, not an expense.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
24	Learning in my organization is seen as a key commodity necessary to guarantee organisational survival.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
25	There is a commonality of purpose in my organisation.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
26	There is total agreement on our organisational vision across all levels, functions, and divisions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
27	All employees are committed to the goals of this organisation.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
28	Employees view themselves as partners in charting the direction of the organisation.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
29	We are not afraid to reflect critically on the shared assumptions we have made about our customers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
30	Personnel in this organisation realise that the very way they perceive the marketplace must be continually questioned.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
31	We rarely collectively question our own business about the way we interpret customer information.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Entrepreneurship	(1)	(2)	(3)	(4)	(5)	(6)	(7)
32	In general, the top managers of our company favour a strong emphasis on Research & Development, technological leadership, and innovations.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
33	In the past five years, our company has marketed a large variety of new lines of products or services.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
34	In the past five years, changes in our products or service lines have been mostly of a minor nature.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
35	In dealing with competitors, our company often leads the competition, initiating actions to which our competitors have to respond.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
36	Our company is very seldom the first business to introduce new products/services, administrative techniques, operating technologies,etc.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
37	In dealing with competitors, our company typically adopts a very competitive posture aiming at overtaking the competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
38	In general, the top managers of my company have a strong propensity for high risk projects (with chances of very high return).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
39	The top managers believe owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve our company objectives.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
40	When there is uncertainty, our company typically adopts a "wait and see" posture in order to minimise the probability of making costly decisions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

II. Information and Knowledge Management

		Strongly disagree			Not sure			Strongly agree
1	We have systems to capture and store ideas and knowledge.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	We have systems to codify and categorise ideas in a format that is easier to save for future use.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	IT facilitates the processes of capturing, categorising, storing, and retrieving knowledge and ideas in our company.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
4	We systematically de-brief projects, record good practices that we should extend in the future.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	We make efforts to remember mistakes we made and avoid making similar mistakes in the future.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	Information and knowledge stored in our systems is relevant and sufficient.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	We constantly maintain our information systems and upgrade knowledge stored in the systems.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
8	We treat people's skills and experiences as a very important part of our knowledge assets.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
9	When we need some information or certain knowledge, it is difficult to find out who knows about this, or where we can get this information.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	We very often use knowledge that our company possesses, either from the past experience or from external sources.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
11	We have systems and venues for people to share knowledge and learn from each other in the company.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	We share information and knowledge with our superiors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
13	We share information and knowledge with our subordinates.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
14	We often share ideas with other people of similar interest, even if they are based in different departments.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	There is a great deal of face-to-face communications in our company.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
16	We use information technology to facilitate communications effectively when face-to-face communications are not convenient.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
17	We use information technology to access a wide range of external information and knowledge on competitors and market changes, etc.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
18	Through sharing information and knowledge, we often come up with new ideas that can be used to improve our business.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
19	We have networks of sharing knowledge with other organisations on a regular basis.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
20	People are encouraged to access and use information and knowledge saved in our company systems.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
21	Managers value knowledge as a strategic asset, critical for success.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
22	Our company culture welcomes debates and stimulates discussions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	We hesitate to speak out our ideas because new ideas tend to be highly criticised or ignored.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

24	In our company, new ideas are evaluated equitably.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
25	In our company, we evaluate ideas based on their merits, no matter who comes up with the ideas.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
26	In our company, we evaluate new ideas rapidly on a regular basis.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
27	There is a general culture in our company where people respect knowledge and knowledge ownership.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
28	People who contribute new ideas are rewarded financially in our company.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
29	People who contribute new ideas are invited to participate in future development and implementation of this new idea.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
30	We are held accountable for our own actions and consequences.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

III. Innovativeness

		Strongly disagree			Not sure			Strongly agree
1	In new product and service introductions, our company is often first-to-market.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	Our new products and services are often perceived very novel by customers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	Our recent new products and services contain only minor changes from our previous products and services.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
4	New products and services in our company often take us up against new competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	In comparison with our competitors, our company has introduced more innovative products and services during the past five years.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	In comparison with our competitors, our company is faster in bringing new products or services into the market.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	In comparison with our competitors, our company has a lower success rate in new products and services launch.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
8	In comparison with our competitors, our products' most recent marketing program is revolutionary in the market.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
9	Our company's most recent new product introduction required a new form of advertising and promotion, different from that used for our existing products.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	In new product and service introductions, our company is often at the cutting edge of technology.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
11	The technology used in our main operations is very up-to-date.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	Our future investments in new machinery and equipment are significant compared to our annual turnover.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
13	In comparison with our competitors, we are late in adoption of technological innovations.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
14	Our firm's R & D or product development resources are not adequate to handle the development need of new products and services.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	The nature of the manufacturing process in our company is new compared to that of our main competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

16	We are constantly improving our business processes.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
17	Our company changes production methods at a great speed in comparison with our competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
18	Our future investments in new methods of production are significant compared to our annual turnover.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
19	During the past five years, our company has developed many new management approaches.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
20	We get a lot of support from managers if we want to try new ways of doing things.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
21	Management is very cautious in adopting innovative ideas.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
22	Key executives of the firm are willing to take risks to seize and explore 'chancy' growth opportunities.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	Management actively responds to the adoption of "new ways of doing things" by main competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
24	Senior executives constantly seek unusual, novel solutions to problems via the use of 'idea men'.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
25	In our company, we tolerate individuals who do things in a different way.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
26	We are willing to try new ways of doing things and seek unusual, novel solutions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
27	We encourage people to think and behave in original and novel ways.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
28	When we see new ways of doing things, we are slow at adopting them.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
29	When we cannot solve a problem using conventional methods, we improvise on new methods.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

IV. Business Environment, Strategic Types and Performance

Business Environment

		Strongly disagree			Not sure			Strongly agree
1	Our company must change its marketing practices extremely frequently (e.g. semi-annually) to keep up with the market and competitors.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	The rate at which our products and services are getting obsolete in the industry is very high.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	Actions of competitors are unpredictable and very difficult to forecast.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
4	Market demand and consumer tastes are fairly easy to forecast.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	The production/ service technology of the industry changes very frequently and often in a major way.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	The external environment is very risky, full of challenges to our company's survival in the industry.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	The external environment is very stressful and hostile, very hard for us to keep afloat.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
8	Our company can control and manipulate the external environment to our own advantage, and possess a dominant position in the industry.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Strategic Types

Please read the following four statements on organisational strategic types and tick the one in the box that most closely describes your company. Please tick one box only.

(1)	Type 1	This company attempts to locate and maintain a secure niche in a relatively stable product or service area. The company tends to offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering higher quality, superior service, lower prices, and so forth. Often this company is not at the forefront of developments in the industry – it tends to ignore industry changes that have no direct influence on current areas of operation and concentrates instead on doing the best job possible in a limited area.
(2)	Type 2	This company does not appear to have a consistent product-market orientation. The company is usually not as aggressive in maintaining established products and markets as some of its competitors, nor is it willing to take as many risks as other competitors. Rather, the company responds in those areas where it is forced to by environmental pressures.
(3)	Type 3	This company typically operates within a broad product-market domain that undergoes periodic redefinition. The company values being 'first in' in new product and market areas even if not all of these efforts prove to be highly profitable. The organisation responds rapidly to early signals concerning areas of opportunity, and these responses often lead to a new round of competitive actions. However, this company may not maintain market strength in all of the areas it enters.
(4)	Type 4	This company attempts to maintain a stable, limited line of products or services, while at the same time moving out quickly to follow a carefully selected set of the more promising new developments in the industry. The company is seldom 'first in' with new products or services. However, by carefully monitoring the actions of major competitors in areas compatible with its stable product-market base, the company can frequently be 'second in' with a more cost-efficient product or service.

Business Performance

Please answer each of the following questions by ticking a number that best corresponds to your business performance in comparison to your main competitors.

		Performance compared to main competitors						
		Much worse			About same			Much better
1	Return on capital employed	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	Sales growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	Earning / per share	(1)	(2)	(3)	(4)	(5)	(6)	(7)
4	Training spend (per year)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	New products developed in the last five years	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Background Information

1	In which department do you work?	....	
2	Number of employees in your department:	....	
3	What is your position in the company?	❑ Executive	❑ Administrators
		❑ Senior Management	❑ Engineers
		❑ Middle Management	❑ Other ....
4	How many years have you been working in your current department?	....	
5	How many years have you been working in your company?	....	

Appendix 3. Reminder letter for response chase-up

UNIVERSITY OF WOLVERHAMPTON

Wolverhampton Business School
Shropshire Campus
Shifnal Road
Priorslee
Telford TF2 9NT
Shropshire
Tel: +44 1902 321651
Fax: +44 1902 321777

Date as postmark

Dear Sir or Madam:

As you may recall our "Knowledge Management and Performance Survey" in December 2002, we are writing to ask if you could complete the questionnaire and return it to us.

Just a couple of points about this survey:-

- It is the final stage of our 3-year knowledge management project. The results of this survey will draw out frameworks of information and knowledge management best practices that can be used to improve company performance. The final report, due for publication in July 2003, will be available to you upon request.
- The companies we contact for participation are carefully selected and numerically coded. Any information you provide will be treated in the strictest confidence. No company or personnel will be identified in the final report.

If you need another copy of the questionnaire, please do not hesitate to give us a call at 01902 321651, or email c.wang@wlv.ac.uk We apologise for contacting you again if you have already returned the questionnaire, and thank you for your valuable time and cooperation.

We look forward to hearing from you shortly.

Warm regards.

Catherine Wang
Researcher
The Centre for Enterprise Excellence
Wolverhampton Business School

Professor Pervaiz Ahmed
Chair in Management
Head, Centre for Enterprise Excellence
Wolverhampton Business School

Appendix 4 Summary of Feedback of Pilot Questionnaire

	Issues Raised	Actions Taken
Clarification of incentives	Receiving and executive summary of the final report is a fair inducement to encourage the recipient to spend 30 minutes blasting through a battery of questions, concluding with some quite sensitive performance scoring. But can they see where this particular exercise is heading (i.e. What will the executive summary's' story line be?) and - if all goes to plan - when can they expect it? Will you be prompt back?	The final cover letter indicates a proposed time of the availability of the research report summary.
Clarification of wording	What does 'the impact of information and knowledge management' mean to the recipient?	This has been changed into 'to investigate how to manage information and knowledge to improve organizational performance'.
	From the recipients viewpoint what does 'modification of theoretical frameworks and improved guidance on information and knowledge management' have to do with actual practice in the real business world?	This has been changed into 'understanding of knowledge management best practices in the business world'.
	Similar thoughts occur in relation to their possible participation in the study beyond completing and returning the questionnaire: What's the story, and what will be in it for them? They may need to get agreement from others to participate: how will they explain their interest in being involved.	This has been modified into asking 'if they are interested to know more about this research' instead of asking them to participate further.
	Does 'strongly agree' mean 'yes', and 'strongly disagree' mean 'no'?	More narrative explanation of these scales are included in the instructions.
	'in this business unit' has caused confusion to respondents. This appears many time in the original market orientation scales adopted.	All have been changed into 'in this company'.

	In the market orientation scales, terms of 'frequency' such as 'once a year' or 'once a quarter' has caused confusion. For example, question 7 of market orientation, the question asks 'we have interdepartmental meetings at least once a quarter to discuss market trends and developments'. The respondent marked 'twice a year' to the question, but did not know how to tick the number box.	All have been changed into 'very often' with brackets to indicate the originals.
	Some words caused confusion. For example, question 12 of market orientation, 'forever', the respondent asked if it means 'it is not decided at all'.	Words have been accordingly changed.
Double questions	Some questionnaire can be split into two questions, because the respondent have two opposite answers to the two parts of the same question. For example, the question about 'a learning culture' "we are held accountability for our own actions and consequences, and learn from lessons and experiences". The respondent answers yes to 'we are held accountability for our own actions and consequences', but answers 'no' to 'learn from lessons and experiences'.	Questions such as these have been split into two questions.
Structuring	The structure of the questionnaire: the Information and Knowledge Management Section contains many new concepts, such as organisational memory. Therefore it may give the impression that the questionnaire is very heavy or difficult to answer.	This section has been removed into the middle of this questionnaire. Also sub-titles have been removed to avoid putting people off.
	Within the subcomponents, the same issue is raised so that easy questions should come first before any more difficult questions are asked.	Changes have been made accordingly.

Appendix 5. Descriptive statistics of survey data

Frequency

MARKOR (Market Orientation)

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.85	1	.5	.5	.5
	2.10	1	.5	.5	.9
	2.35	1	.5	.5	1.4
	2.80	1	.5	.5	1.9
	2.95	1	.5	.5	2.3
	3.10	1	.5	.5	2.8
	3.15	3	1.4	1.4	4.2
	3.25	1	.5	.5	4.7
	3.40	2	.9	.9	5.6
	3.50	3	1.4	1.4	7.0
	3.55	1	.5	.5	7.5
	3.60	1	.5	.5	8.0
	3.65	3	1.4	1.4	9.4
	3.70	4	1.9	1.9	11.3
	3.75	5	2.3	2.3	13.6
	3.80	2	.9	.9	14.6
	3.85	5	2.3	2.3	16.9
	3.95	3	1.4	1.4	18.3
	4.00	4	1.9	1.9	20.2
	4.05	4	1.9	1.9	22.1
	4.10	4	1.9	1.9	23.9
	4.15	5	2.3	2.3	26.3
	4.20	4	1.9	1.9	28.2
	4.25	3	1.4	1.4	29.6
	4.30	3	1.4	1.4	31.0
	4.35	5	2.3	2.3	33.3
	4.40	1	.5	.5	33.8
	4.45	3	1.4	1.4	35.2
	4.50	6	2.8	2.8	38.0
	4.55	3	1.4	1.4	39.4
	4.60	1	.5	.5	39.9
	4.65	5	2.3	2.3	42.3
	4.70	2	.9	.9	43.2
	4.75	5	2.3	2.3	45.5
	4.80	4	1.9	1.9	47.4
	4.85	7	3.3	3.3	50.7
	4.90	3	1.4	1.4	52.1
	4.95	5	2.3	2.3	54.5
	5.00	1	.5	.5	54.9

	5.05	6	2.8	2.8	57.7
	5.10	3	1.4	1.4	59.2
	5.15	2	.9	.9	60.1
	5.25	3	1.4	1.4	61.5
	5.30	2	.9	.9	62.4
	5.35	3	1.4	1.4	63.8
	5.40	2	.9	.9	64.8
	5.45	3	1.4	1.4	66.2
	5.50	7	3.3	3.3	69.5
	5.55	4	1.9	1.9	71.4
	5.60	4	1.9	1.9	73.2
	5.65	3	1.4	1.4	74.6
	5.70	4	1.9	1.9	76.5
	5.75	1	.5	.5	77.0
	5.80	6	2.8	2.8	79.8
	5.85	3	1.4	1.4	81.2
	5.90	6	2.8	2.8	84.0
	5.95	2	.9	.9	85.0
	6.00	3	1.4	1.4	86.4
	6.05	2	.9	.9	87.3
	6.10	1	.5	.5	87.8
	6.15	3	1.4	1.4	89.2
	6.20	2	.9	.9	90.1
	6.30	3	1.4	1.4	91.5
	6.35	2	.9	.9	92.5
	6.40	1	.5	.5	93.0
	6.45	4	1.9	1.9	94.8
	6.50	2	.9	.9	95.8
	6.55	3	1.4	1.4	97.2
	6.60	2	.9	.9	98.1
	6.65	1	.5	.5	98.6
	6.75	1	.5	.5	99.1
	6.95	1	.5	.5	99.5
	7.00	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to all the questions included in the market orientation construct.

LEARNOR (Learning Orientation)

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.55	2	.9	.9	.9
	1.91	1	.5	.5	1.4
	2.09	2	.9	.9	2.3
	2.18	1	.5	.5	2.8
	2.27	2	.9	.9	3.8
	2.36	2	.9	.9	4.7
	2.45	1	.5	.5	5.2
	2.55	2	.9	.9	6.1
	2.64	1	.5	.5	6.6
	2.73	3	1.4	1.4	8.0
	2.82	2	.9	.9	8.9
	2.91	2	.9	.9	9.9
	3.00	2	.9	.9	10.8
	3.09	4	1.9	1.9	12.7
	3.18	7	3.3	3.3	16.0
	3.27	6	2.8	2.8	18.8
	3.36	3	1.4	1.4	20.2
	3.45	6	2.8	2.8	23.0
	3.55	5	2.3	2.3	25.4
	3.64	3	1.4	1.4	26.8
	3.73	4	1.9	1.9	28.6
	3.82	5	2.3	2.3	31.0
	3.91	4	1.9	1.9	32.9
	4.00	5	2.3	2.3	35.2
	4.09	6	2.8	2.8	38.0
	4.18	6	2.8	2.8	40.8
	4.27	4	1.9	1.9	42.7
	4.36	9	4.2	4.2	46.9
	4.45	9	4.2	4.2	51.2
	4.55	4	1.9	1.9	53.1
	4.64	11	5.2	5.2	58.2
	4.73	4	1.9	1.9	60.1
	4.82	8	3.8	3.8	63.8
	4.91	5	2.3	2.3	66.2
	5.00	6	2.8	2.8	69.0
	5.09	6	2.8	2.8	71.8
	5.18	11	5.2	5.2	77.0
	5.27	4	1.9	1.9	78.9
	5.36	5	2.3	2.3	81.2
	5.45	4	1.9	1.9	83.1
	5.55	5	2.3	2.3	85.4
	5.64	7	3.3	3.3	88.7
	5.73	5	2.3	2.3	91.1
	5.82	5	2.3	2.3	93.4

	5.91	3	1.4	1.4	94.8
	6.00	1	.5	.5	95.3
	6.09	1	.5	.5	95.8
	6.18	4	1.9	1.9	97.7
	6.27	2	.9	.9	98.6
	6.36	1	.5	.5	99.1
	6.64	1	.5	.5	99.5
	7.00	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to all the questions included in the learning orientation construct.

KMO (Knowledge Management Orientation)

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.05	1	.5	.5	.5
	2.40	1	.5	.5	.9
	2.50	1	.5	.5	1.4
	2.55	1	.5	.5	1.9
	2.70	1	.5	.5	2.3
	2.85	2	.9	.9	3.3
	2.90	2	.9	.9	4.2
	2.95	1	.5	.5	4.7
	3.00	2	.9	.9	5.6
	3.05	1	.5	.5	6.1
	3.15	4	1.9	1.9	8.0
	3.20	3	1.4	1.4	9.4
	3.25	1	.5	.5	9.9
	3.30	1	.5	.5	10.3
	3.35	3	1.4	1.4	11.7
	3.40	2	.9	.9	12.7
	3.45	2	.9	.9	13.6
	3.50	1	.5	.5	14.1
	3.55	3	1.4	1.4	15.5
	3.60	2	.9	.9	16.4
	3.65	1	.5	.5	16.9
	3.70	3	1.4	1.4	18.3
	3.75	3	1.4	1.4	19.7
	3.80	2	.9	.9	20.7
	3.85	5	2.3	2.3	23.0
	3.95	5	2.3	2.3	25.4
	4.00	2	.9	.9	26.3
	4.05	7	3.3	3.3	29.6
	4.10	4	1.9	1.9	31.5
	4.15	3	1.4	1.4	32.9
	4.20	1	.5	.5	33.3
	4.25	6	2.8	2.8	36.2
	4.30	3	1.4	1.4	37.6
	4.35	2	.9	.9	38.5
	4.40	3	1.4	1.4	39.9
	4.45	3	1.4	1.4	41.3
	4.50	9	4.2	4.2	45.5
	4.55	2	.9	.9	46.5
	4.60	2	.9	.9	47.4
	4.65	4	1.9	1.9	49.3
	4.70	3	1.4	1.4	50.7
	4.75	3	1.4	1.4	52.1
	4.80	4	1.9	1.9	54.0
	4.85	3	1.4	1.4	55.4

	4.90	4	1.9	1.9	57.3
	4.95	4	1.9	1.9	59.2
	5.00	5	2.3	2.3	61.5
	5.05	5	2.3	2.3	63.8
	5.10	7	3.3	3.3	67.1
	5.15	6	2.8	2.8	70.0
	5.20	4	1.9	1.9	71.8
	5.25	4	1.9	1.9	73.7
	5.30	9	4.2	4.2	77.9
	5.35	1	.5	.5	78.4
	5.40	5	2.3	2.3	80.8
	5.45	3	1.4	1.4	82.2
	5.50	5	2.3	2.3	84.5
	5.55	3	1.4	1.4	85.9
	5.60	4	1.9	1.9	87.8
	5.65	3	1.4	1.4	89.2
	5.75	1	.5	.5	89.7
	5.80	1	.5	.5	90.1
	5.85	3	1.4	1.4	91.5
	5.90	3	1.4	1.4	93.0
	6.00	2	.9	.9	93.9
	6.05	1	.5	.5	94.4
	6.10	1	.5	.5	94.8
	6.15	1	.5	.5	95.3
	6.20	1	.5	.5	95.8
	6.25	3	1.4	1.4	97.2
	6.30	1	.5	.5	97.7
	6.35	1	.5	.5	98.1
	6.40	1	.5	.5	98.6
	6.45	1	.5	.5	99.1
	6.60	1	.5	.5	99.5
	6.70	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to the 20 questions included in the final knowledge management orientation construct.

KMO (all 30 items) – The Original Knowledge Management Orientation

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.23	1	.5	.5	.5
	2.23	1	.5	.5	.9
	2.57	1	.5	.5	1.4
	2.60	1	.5	.5	1.9
	2.63	1	.5	.5	2.3
	2.70	1	.5	.5	2.8
	2.77	1	.5	.5	3.3
	2.80	1	.5	.5	3.8
	2.97	1	.5	.5	4.2
	3.03	3	1.4	1.4	5.6
	3.07	2	.9	.9	6.6
	3.10	1	.5	.5	7.0
	3.13	1	.5	.5	7.5
	3.20	2	.9	.9	8.5
	3.23	2	.9	.9	9.4
	3.30	1	.5	.5	9.9
	3.37	1	.5	.5	10.3
	3.40	2	.9	.9	11.3
	3.43	2	.9	.9	12.2
	3.47	1	.5	.5	12.7
	3.50	1	.5	.5	13.1
	3.53	1	.5	.5	13.6
	3.60	1	.5	.5	14.1
	3.63	3	1.4	1.4	15.5
	3.67	2	.9	.9	16.4
	3.70	2	.9	.9	17.4
	3.73	1	.5	.5	17.8
	3.77	1	.5	.5	18.3
	3.80	1	.5	.5	18.8
	3.83	1	.5	.5	19.2
	3.87	2	.9	.9	20.2
	3.90	6	2.8	2.8	23.0
	3.93	1	.5	.5	23.5
	3.97	3	1.4	1.4	24.9
	4.00	2	.9	.9	25.8
	4.03	2	.9	.9	26.8
	4.07	2	.9	.9	27.7
	4.10	4	1.9	1.9	29.6
	4.13	4	1.9	1.9	31.5
	4.17	3	1.4	1.4	32.9
	4.20	4	1.9	1.9	34.7
	4.23	2	.9	.9	35.7
	4.27	5	2.3	2.3	38.0
	4.30	3	1.4	1.4	39.4

	4.33	3	1.4	1.4	40.8
	4.43	3	1.4	1.4	42.3
	4.47	5	2.3	2.3	44.6
	4.50	3	1.4	1.4	46.0
	4.53	1	.5	.5	46.5
	4.57	4	1.9	1.9	48.4
	4.60	3	1.4	1.4	49.8
	4.67	1	.5	.5	50.2
	4.70	2	.9	.9	51.2
	4.73	2	.9	.9	52.1
	4.80	4	1.9	1.9	54.0
	4.83	2	.9	.9	54.9
	4.87	1	.5	.5	55.4
	4.90	2	.9	.9	56.3
	4.93	2	.9	.9	57.3
	4.97	7	3.3	3.3	60.6
	5.00	4	1.9	1.9	62.4
	5.03	2	.9	.9	63.4
	5.07	4	1.9	1.9	65.3
	5.10	3	1.4	1.4	66.7
	5.13	7	3.3	3.3	70.0
	5.17	2	.9	.9	70.9
	5.20	6	2.8	2.8	73.7
	5.30	2	.9	.9	74.6
	5.33	3	1.4	1.4	76.1
	5.37	10	4.7	4.7	80.8
	5.40	1	.5	.5	81.2
	5.43	4	1.9	1.9	83.1
	5.47	1	.5	.5	83.6
	5.50	1	.5	.5	84.0
	5.53	3	1.4	1.4	85.4
	5.57	2	.9	.9	86.4
	5.60	1	.5	.5	86.9
	5.63	1	.5	.5	87.3
	5.67	4	1.9	1.9	89.2
	5.70	3	1.4	1.4	90.6
	5.73	3	1.4	1.4	92.0
	5.77	1	.5	.5	92.5
	5.83	1	.5	.5	93.0
	5.93	2	.9	.9	93.9
	6.03	1	.5	.5	94.4
	6.07	1	.5	.5	94.8
	6.10	1	.5	.5	95.3
	6.13	2	.9	.9	96.2
	6.17	1	.5	.5	96.7
	6.23	1	.5	.5	97.2
	6.30	2	.9	.9	98.1

	6.33	1	.5	.5	98.6
	6.50	1	.5	.5	99.1
	6.63	1	.5	.5	99.5
	6.67	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to all the questions included in the original knowledge management orientation construct.

INNOVOR (Innovative Orientation)

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.85	1	.5	.5	.5
	2.10	1	.5	.5	.9
	2.20	1	.5	.5	1.4
	2.55	1	.5	.5	1.9
	2.70	1	.5	.5	2.3
	2.75	1	.5	.5	2.8
	2.80	1	.5	.5	3.3
	2.85	4	1.9	1.9	5.2
	3.00	1	.5	.5	5.6
	3.05	1	.5	.5	6.1
	3.10	2	.9	.9	7.0
	3.15	1	.5	.5	7.5
	3.20	6	2.8	2.8	10.3
	3.25	1	.5	.5	10.8
	3.30	4	1.9	1.9	12.7
	3.35	8	3.8	3.8	16.4
	3.40	6	2.8	2.8	19.2
	3.45	2	.9	.9	20.2
	3.50	3	1.4	1.4	21.6
	3.55	4	1.9	1.9	23.5
	3.60	5	2.3	2.3	25.8
	3.65	9	4.2	4.2	30.0
	3.70	5	2.3	2.3	32.4
	3.75	5	2.3	2.3	34.7
	3.80	3	1.4	1.4	36.2
	3.85	1	.5	.5	36.6
	3.90	5	2.3	2.3	39.0
	3.95	2	.9	.9	39.9
	4.00	6	2.8	2.8	42.7
	4.05	5	2.3	2.3	45.1
	4.10	3	1.4	1.4	46.5
	4.15	12	5.6	5.6	52.1
	4.25	3	1.4	1.4	53.5
	4.30	3	1.4	1.4	54.9
	4.35	7	3.3	3.3	58.2
	4.40	2	.9	.9	59.2
	4.45	3	1.4	1.4	60.6
	4.50	5	2.3	2.3	62.9
	4.55	1	.5	.5	63.4
	4.60	6	2.8	2.8	66.2
	4.65	6	2.8	2.8	69.0
	4.70	6	2.8	2.8	71.8
	4.75	2	.9	.9	72.8
	4.80	4	1.9	1.9	74.6

	4.85	5	2.3	2.3	77.0
	4.90	5	2.3	2.3	79.3
	4.95	4	1.9	1.9	81.2
	5.00	2	.9	.9	82.2
	5.10	2	.9	.9	83.1
	5.15	4	1.9	1.9	85.0
	5.20	3	1.4	1.4	86.4
	5.25	2	.9	.9	87.3
	5.30	2	.9	.9	88.3
	5.35	1	.5	.5	88.7
	5.40	2	.9	.9	89.7
	5.45	2	.9	.9	90.6
	5.50	3	1.4	1.4	92.0
	5.55	2	.9	.9	93.0
	5.65	2	.9	.9	93.9
	5.75	3	1.4	1.4	95.3
	5.80	3	1.4	1.4	96.7
	5.90	1	.5	.5	97.2
	6.10	1	.5	.5	97.7
	6.20	1	.5	.5	98.1
	6.40	1	.5	.5	98.6
	6.60	2	.9	.9	99.5
	6.75	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to the 20 questions included in final innovative orientation construct.

INNOVOR (all 29 items) – The Original Innovative Orientation

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.97	1	.5	.5	.5
	2.07	2	.9	.9	1.4
	2.76	1	.5	.5	1.9
	2.83	1	.5	.5	2.3
	2.86	1	.5	.5	2.8
	2.90	1	.5	.5	3.3
	2.93	1	.5	.5	3.8
	2.97	1	.5	.5	4.2
	3.00	1	.5	.5	4.7
	3.03	1	.5	.5	5.2
	3.07	1	.5	.5	5.6
	3.10	3	1.4	1.4	7.0
	3.14	2	.9	.9	8.0
	3.21	3	1.4	1.4	9.4
	3.28	2	.9	.9	10.3
	3.31	2	.9	.9	11.3
	3.34	6	2.8	2.8	14.1
	3.38	6	2.8	2.8	16.9
	3.41	6	2.8	2.8	19.7
	3.45	4	1.9	1.9	21.6
	3.48	2	.9	.9	22.5
	3.52	1	.5	.5	23.0
	3.55	3	1.4	1.4	24.4
	3.59	5	2.3	2.3	26.8
	3.62	5	2.3	2.3	29.1
	3.66	4	1.9	1.9	31.0
	3.69	4	1.9	1.9	32.9
	3.72	1	.5	.5	33.3
	3.76	4	1.9	1.9	35.2
	3.79	4	1.9	1.9	37.1
	3.83	6	2.8	2.8	39.9
	3.86	1	.5	.5	40.4
	3.90	3	1.4	1.4	41.8
	3.93	2	.9	.9	42.7
	3.97	2	.9	.9	43.7
	4.00	6	2.8	2.8	46.5
	4.03	1	.5	.5	46.9
	4.07	8	3.8	3.8	50.7
	4.10	1	.5	.5	51.2
	4.14	2	.9	.9	52.1
	4.17	1	.5	.5	52.6
	4.21	2	.9	.9	53.5
	4.24	2	.9	.9	54.5
	4.28	5	2.3	2.3	56.8

	4.31	4	1.9	1.9	58.7
	4.34	4	1.9	1.9	60.6
	4.38	4	1.9	1.9	62.4
	4.41	2	.9	.9	63.4
	4.45	3	1.4	1.4	64.8
	4.48	5	2.3	2.3	67.1
	4.52	2	.9	.9	68.1
	4.55	3	1.4	1.4	69.5
	4.59	5	2.3	2.3	71.8
	4.62	4	1.9	1.9	73.7
	4.66	2	.9	.9	74.6
	4.69	2	.9	.9	75.6
	4.72	3	1.4	1.4	77.0
	4.76	2	.9	.9	77.9
	4.79	1	.5	.5	78.4
	4.83	1	.5	.5	78.9
	4.86	3	1.4	1.4	80.3
	4.90	3	1.4	1.4	81.7
	4.93	1	.5	.5	82.2
	4.97	1	.5	.5	82.6
	5.00	2	.9	.9	83.6
	5.03	2	.9	.9	84.5
	5.07	3	1.4	1.4	85.9
	5.10	1	.5	.5	86.4
	5.14	2	.9	.9	87.3
	5.17	1	.5	.5	87.8
	5.21	1	.5	.5	88.3
	5.28	2	.9	.9	89.2
	5.34	5	2.3	2.3	91.5
	5.38	1	.5	.5	92.0
	5.48	2	.9	.9	93.0
	5.52	2	.9	.9	93.9
	5.55	2	.9	.9	94.8
	5.62	1	.5	.5	95.3
	5.66	2	.9	.9	96.2
	5.69	1	.5	.5	96.7
	5.79	1	.5	.5	97.2
	5.90	2	.9	.9	98.1
	6.31	1	.5	.5	98.6
	6.34	2	.9	.9	99.5
	6.48	1	.5	.5	100.0
	Total	213	100.0	100.0	

Note: * The score of this column is the mean of each company's responses to all the questions included in the original innovative orientation construct.

Performance

	Score*	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	2	.9	.9	.9
	2.00	6	2.8	2.8	3.8
	2.50	10	4.7	4.7	8.5
	3.00	16	7.5	7.5	16.0
	3.50	21	9.9	9.9	25.8
	4.00	63	29.6	29.6	55.4
	4.50	27	12.7	12.7	68.1
	5.00	20	9.4	9.4	77.5
	5.50	14	6.6	6.6	84.0
	6.00	17	8.0	8.0	92.0
	6.50	9	4.2	4.2	96.2
	7.00	8	3.8	3.8	100.0
	Total	213	100.0	100.0	

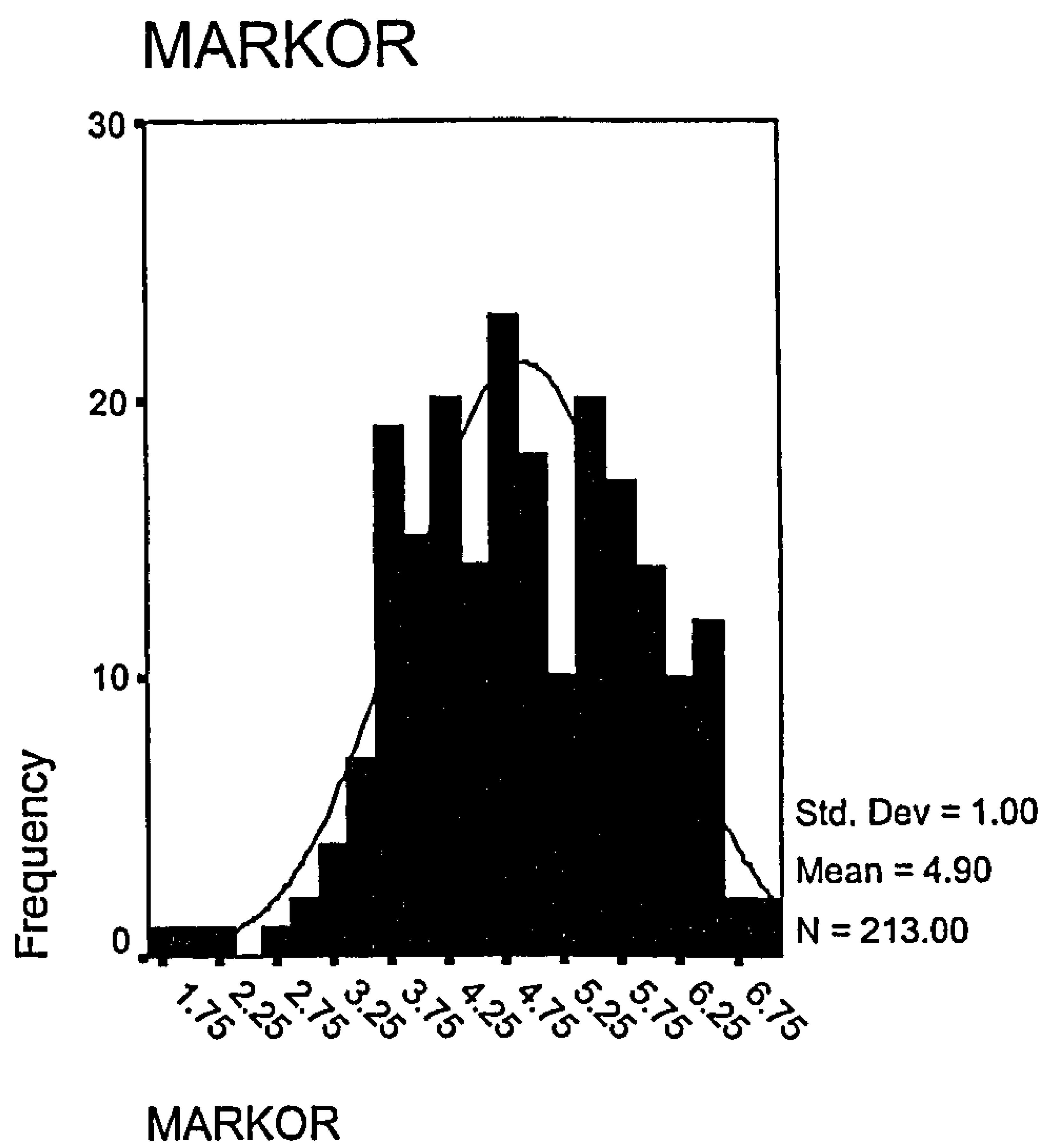
Note: * The score of this column is the mean of each company's responses to all the questions included in the performance construct.

Statistics

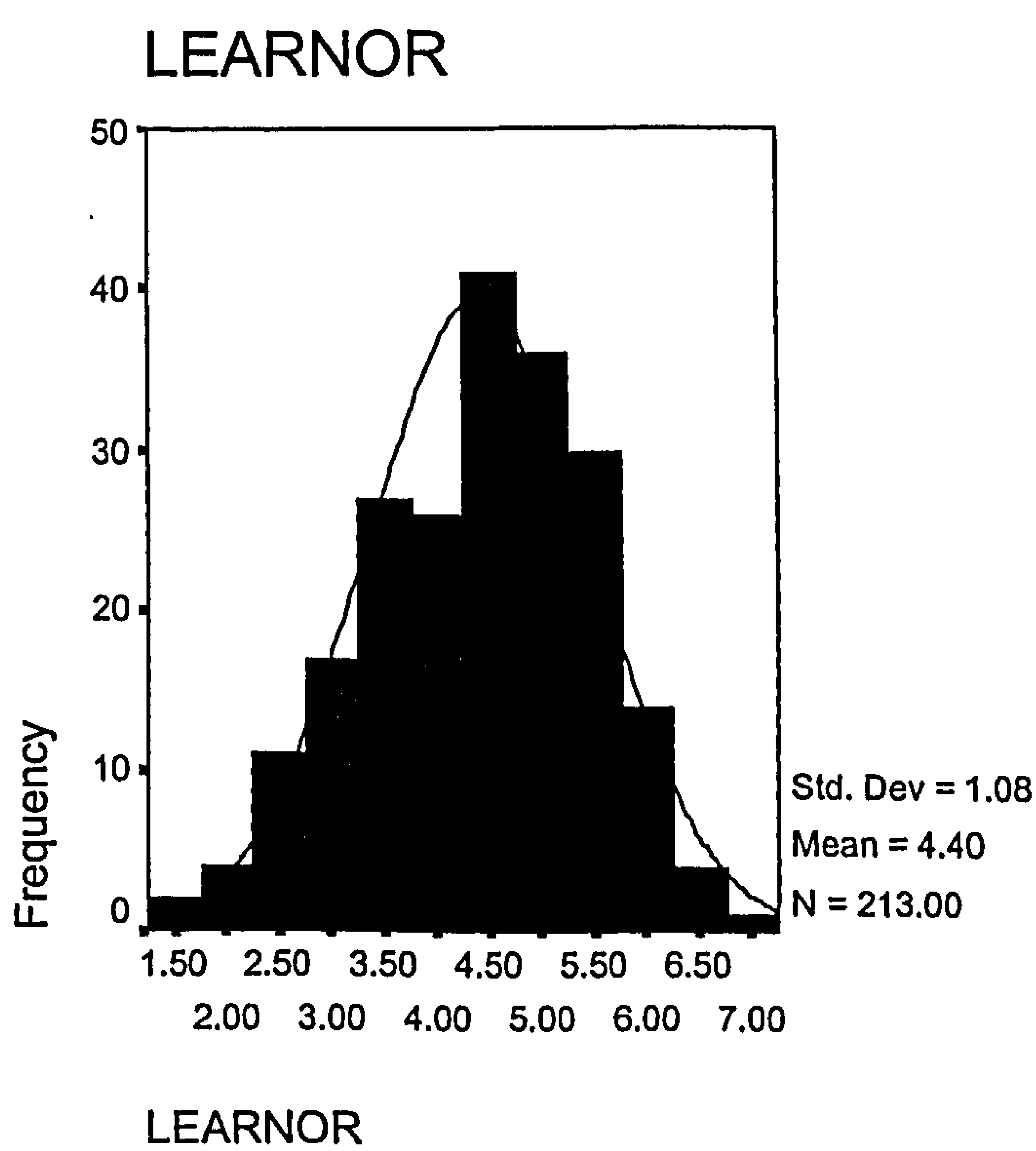
		MARKOR	LEARNOR	KMO (20 items)	KMO (all 30 items)	INNOVOR (20 items)	INNOVOR (all 29 items)	Performance
N	Valid	213	213	213	213	213	213	213
	Missing	0	0	0	0	0	0	0
Mean		4.9005	4.3961	4.6127	4.6058	4.2451	4.1791	4.3545
Std. Deviation		.9969	1.0804	.9546	.9345	.8815	.8214	1.2160
Skewness		-.184	-.290	-.360	-.358	.267	.306	.175
Std. Error of Skewness		.167	.167	.167	.167	.167	.167	.167
Kurtosis		-.352	-.414	.070	.066	.004	.063	-.032
Std. Error of Kurtosis		.332	.332	.332	.332	.332	.332	.332

Histograms

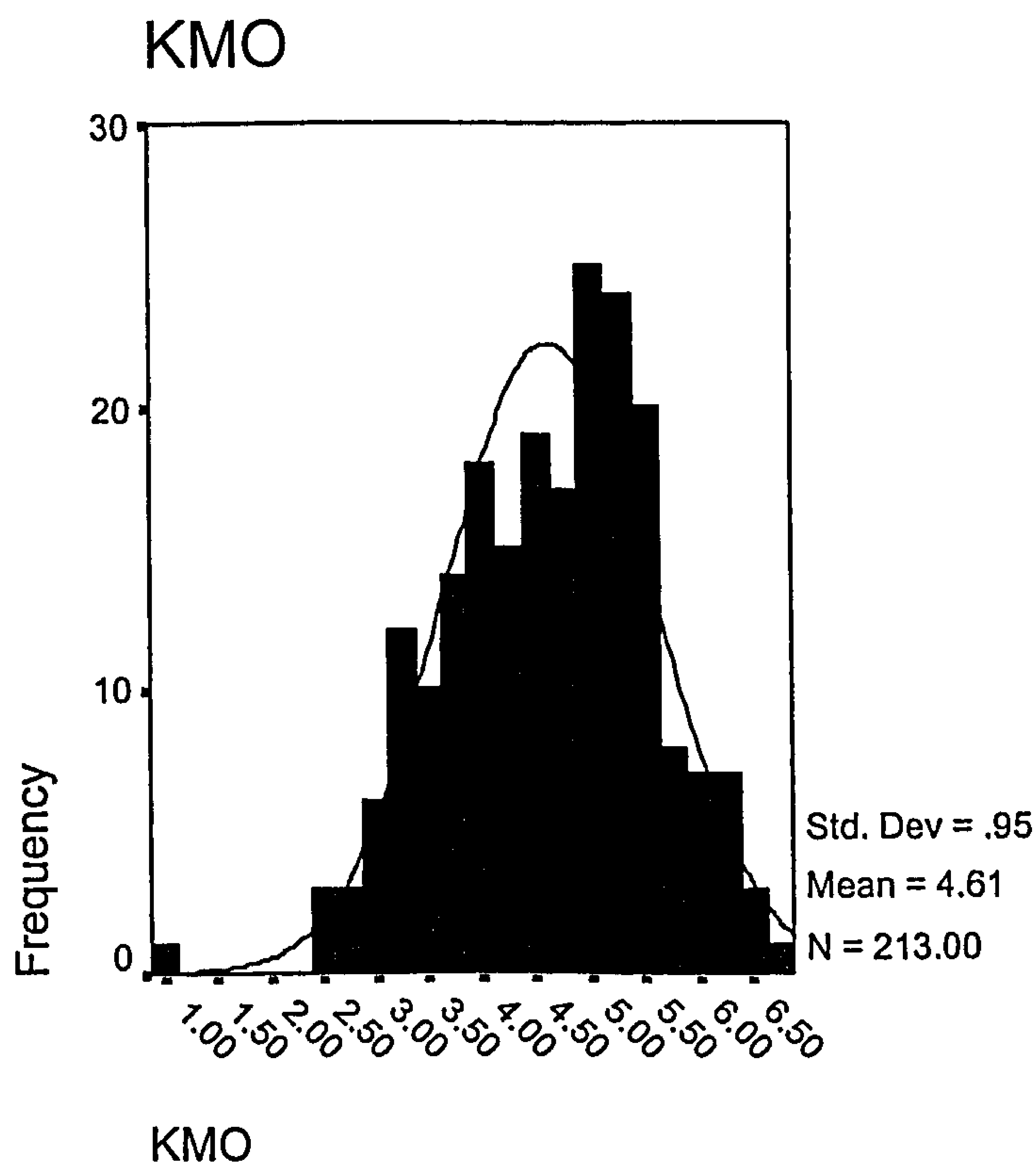
Market Orientation



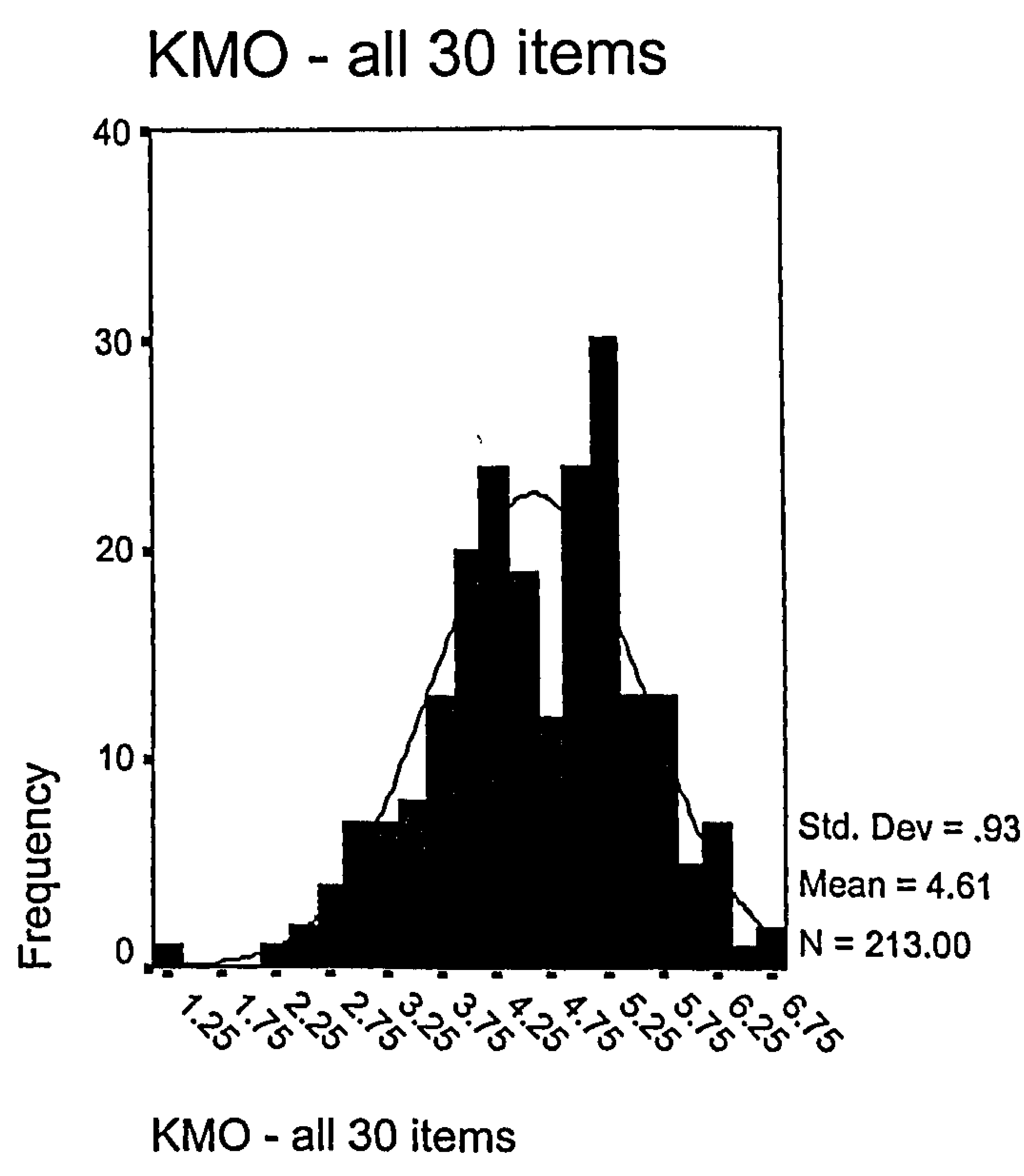
Learning Orientation



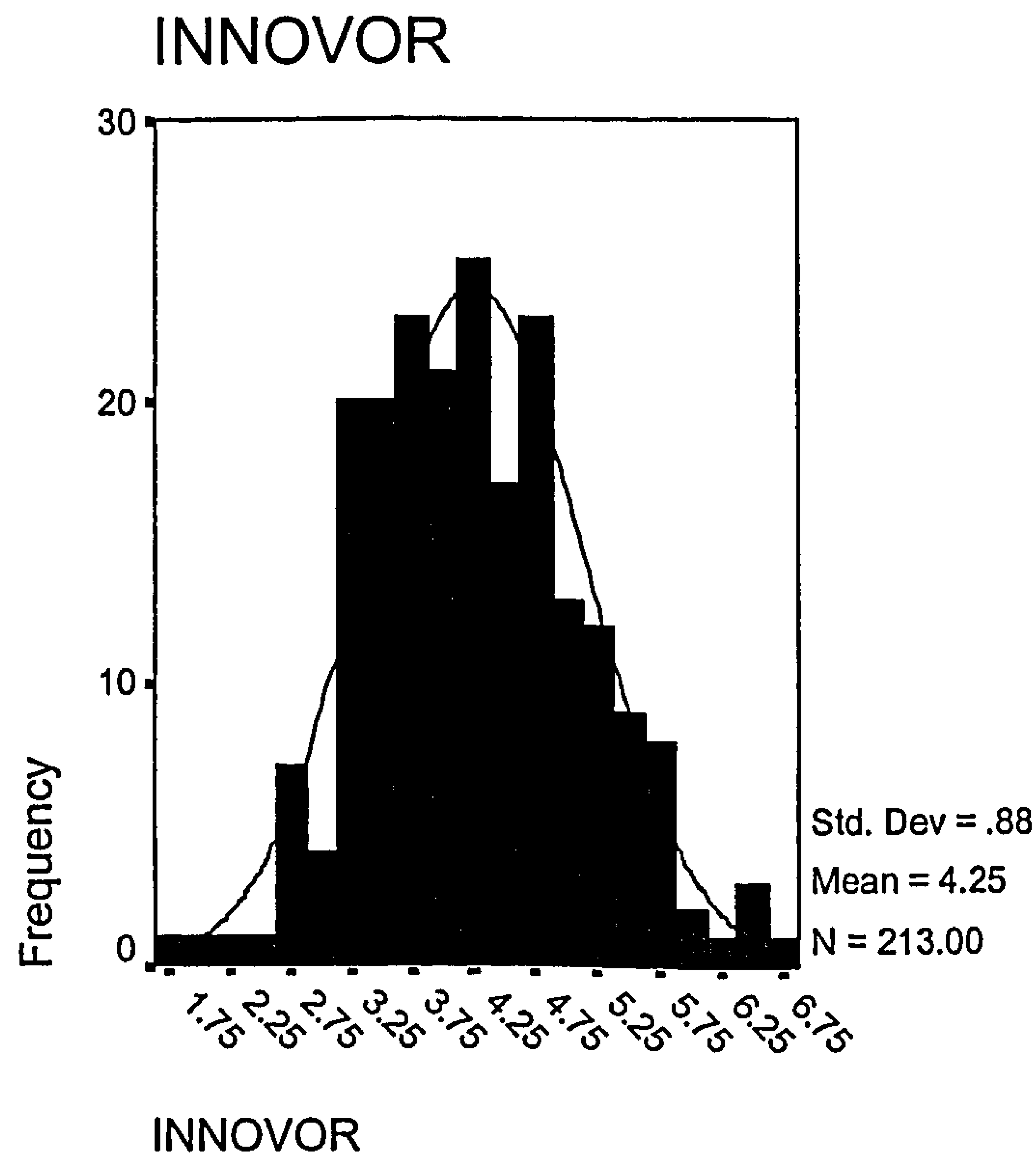
Knowledge Management Orientation (the Final Construct)



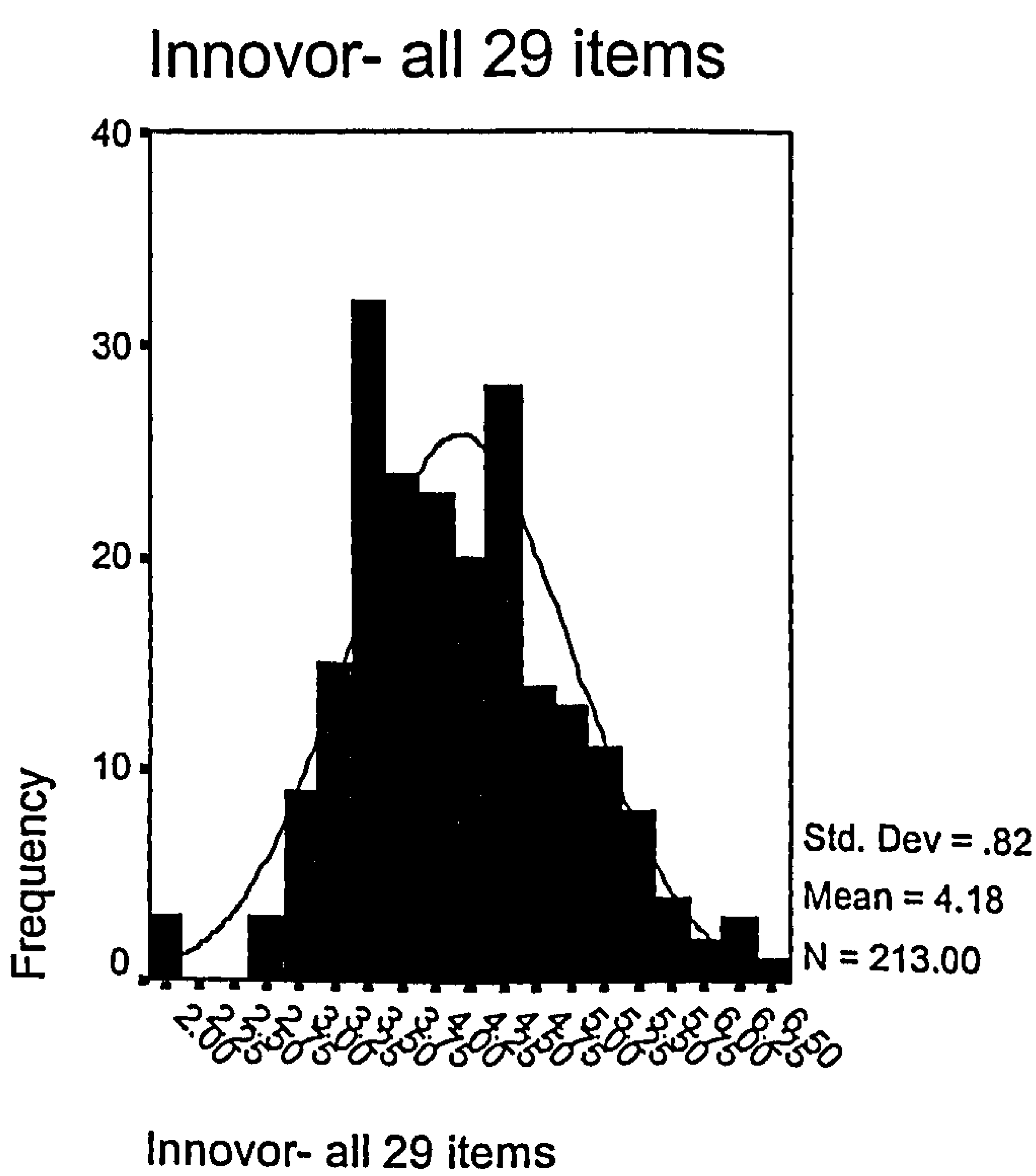
Knowledge Management Orientation (the Initial Construct)



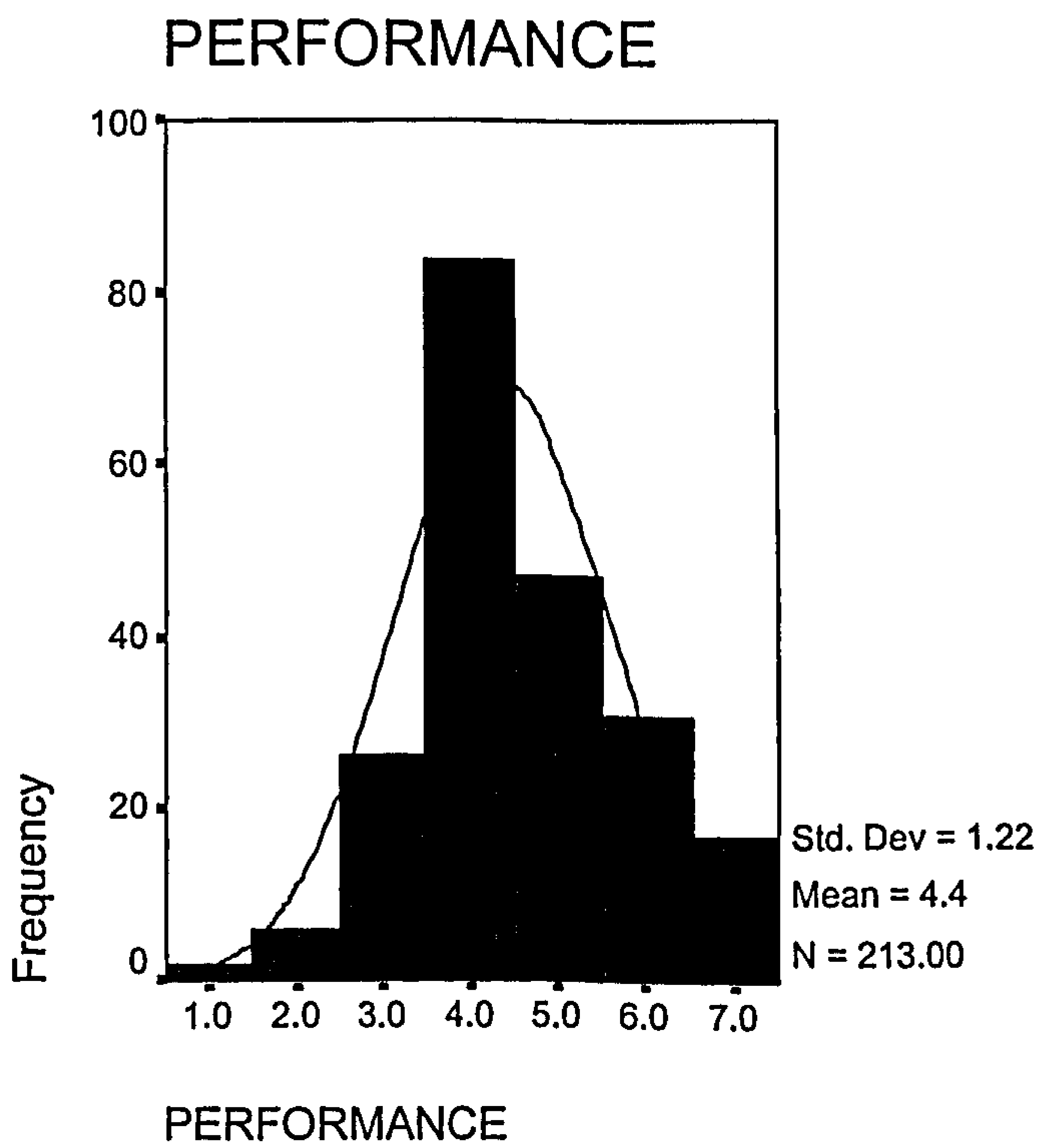
Innovative Orientation (the Final Construct)



Innovative Orientation (the Initial Construct)

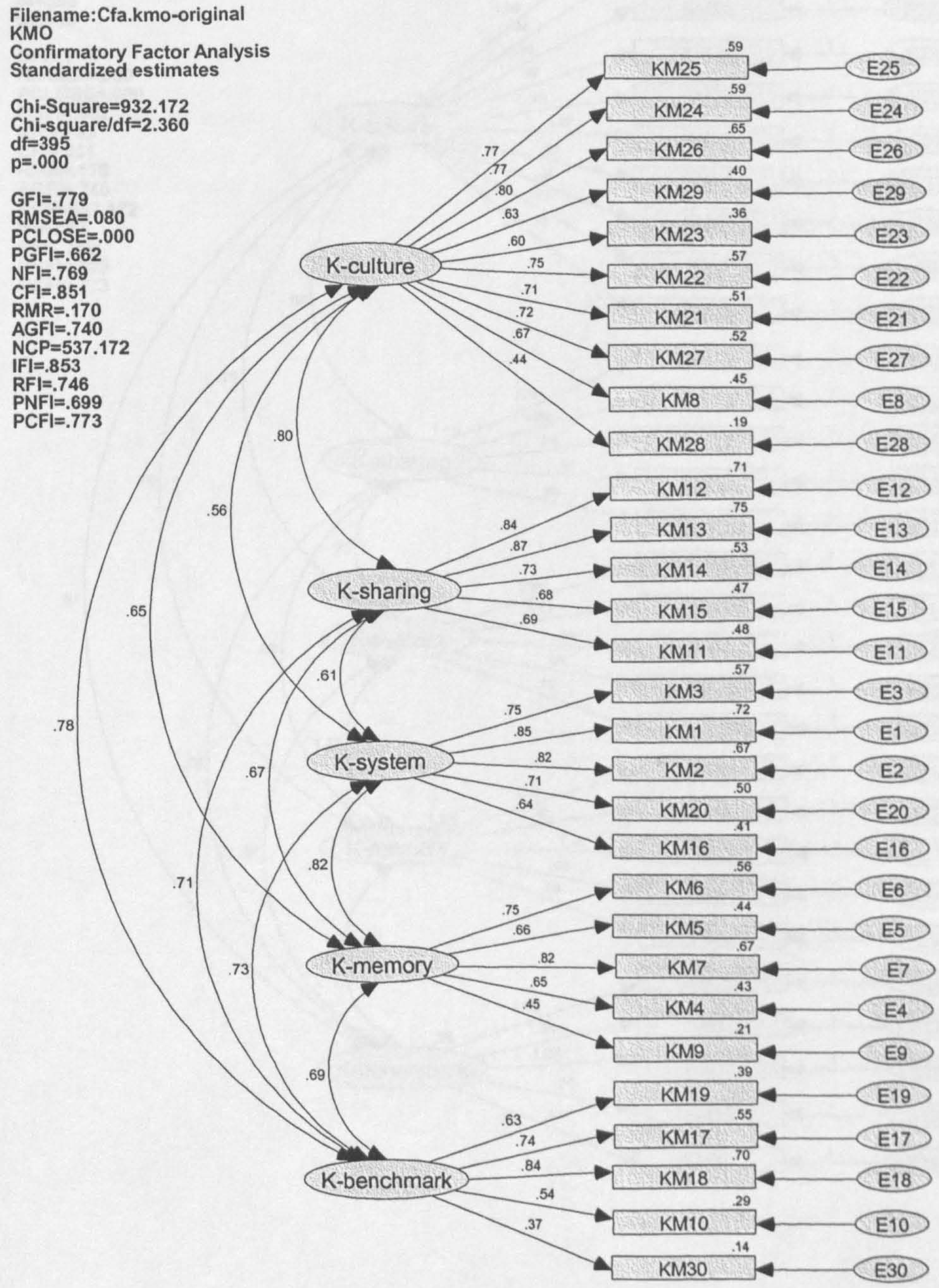


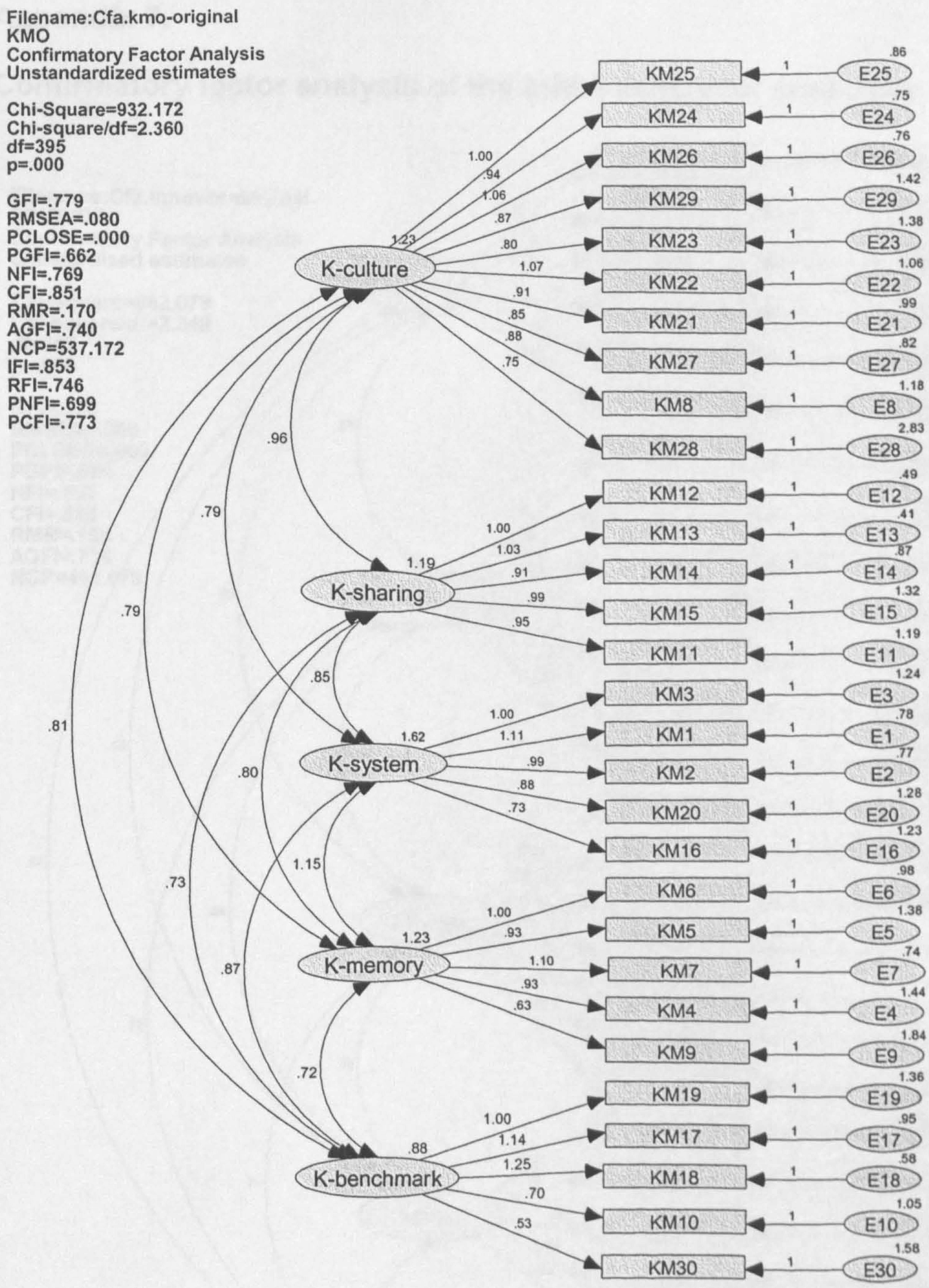
Performance



Appendix 6.

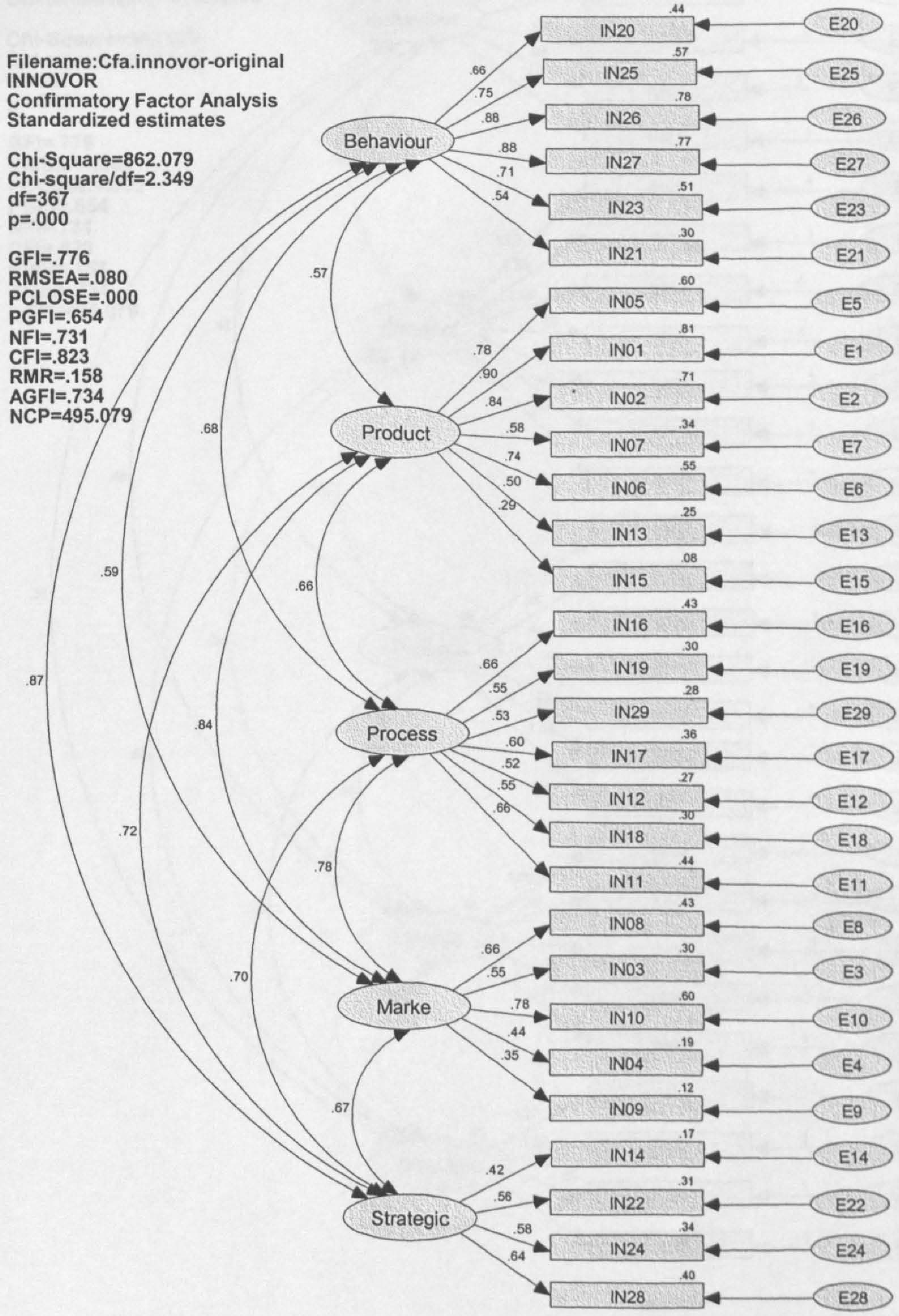
Confirmatory factor analysis of the initial KMO construct

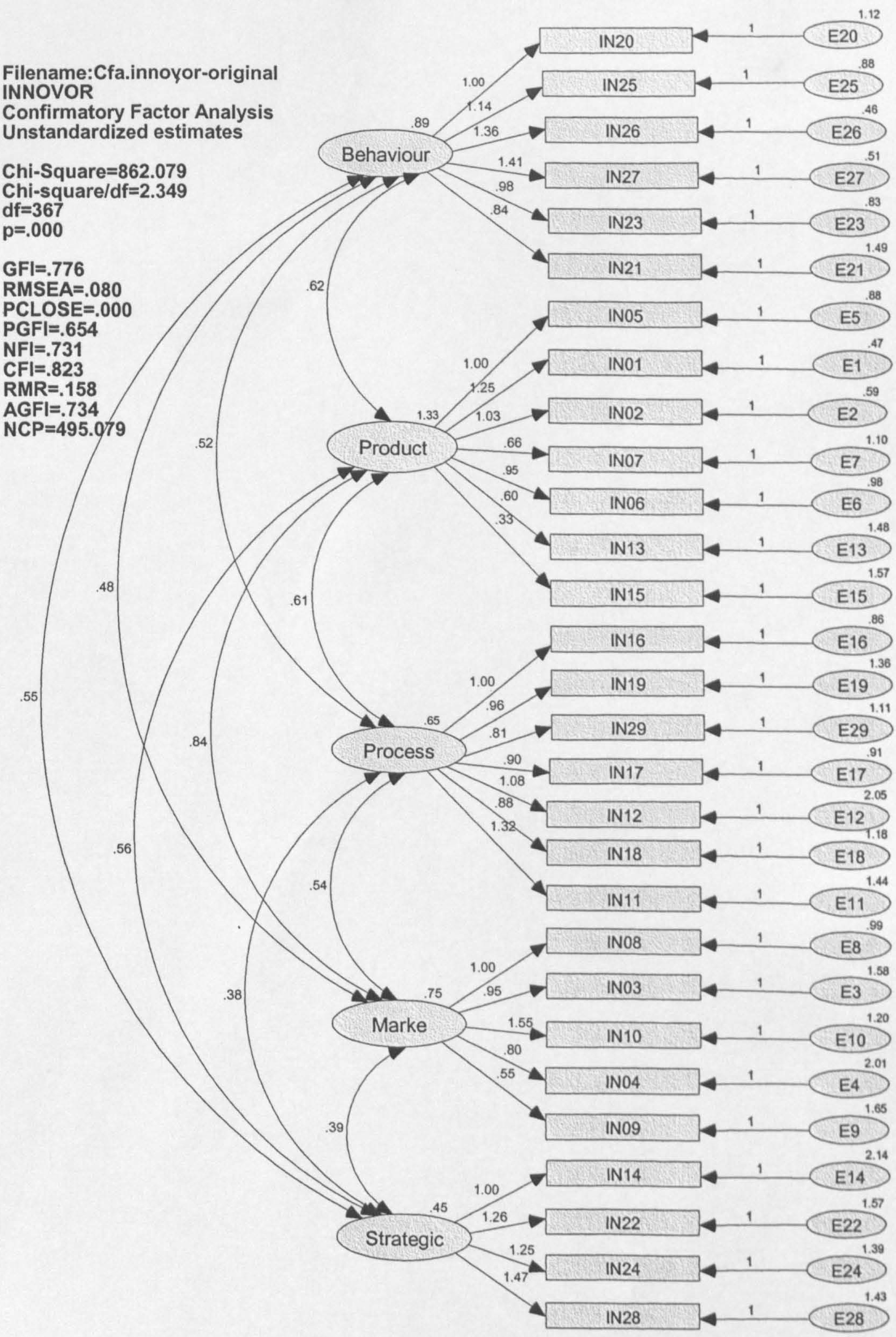



Filename:Cfa.kmo-original
KMO
Confirmatory Factor Analysis
Unstandardized estimates
Chi-Square=932.172
Chi-square/df=2.360
df=395
p=.000
GFI=.779
RMSEA=.080
PCLOSE=.000
PGFI=.662
NFI=.769
CFI=.851
RMR=.170
AGFI=.740
NCP=537.172
IFI=.853
RFI=.746
PNFI=.699
PCFI=.773
K-culture
K-sharing
K-system
K-memory
K-benchmark
KM25
KM24
KM26
KM29
KM23
KM22
KM21
KM27
KM8
KM28
KM12
KM13
KM14
KM15
KM11
KM3
KM1
KM2
KM20
KM16
KM6
KM5
KM7
KM4
KM9
KM19
KM17
KM18
KM10
KM30
E25
E24
E26
E29
E23
E22
E21
E27
E8
E28
E12
E13
E14
E15
E11
E3
E1
E2
E20
E16
E6
E5
E7
E4
E9
E19
E17
E18
E10
E30

Appendix 7.

Confirmatory factor analysis of the initial INNOVOR construct




Filename:Cfa.innovor-original
INNOVOR
Confirmatory Factor Analysis
Unstandardized estimates
Chi-Square=862.079
Chi-square/df=2.349
df=367
p=.000
GFI=.776
RMSEA=.080
PCLOSE=.000
PGFI=.654
NFI=.731
CFI=.823
RMR=.158
AGFI=.734
NCP=495.079
Behaviour
Product
Process
Marke
Strategic
IN20
IN25
IN26
IN27
IN23
IN21
IN05
IN01
IN02
IN07
IN06
IN13
IN15
IN16
IN19
IN29
IN17
IN12
IN18
IN11
IN08
IN03
IN10
IN04
IN09
IN14
IN22
IN24
IN28
E20
E25
E26
E27
E23
E21
E5
E1
E2
E7
E6
E13
E15
E16
E19
E29
E17
E12
E18
E11
E8
E3
E10
E4
E9
E14
E22
E24
E28